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FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

kaged foods being frozen
ultiplate freezer

MARCH 1945

POTENTIAL OF FROZEN FOODS —A Special Report

A Flavorist Views Food Processing

What Army Wants in Dehydrated Foods

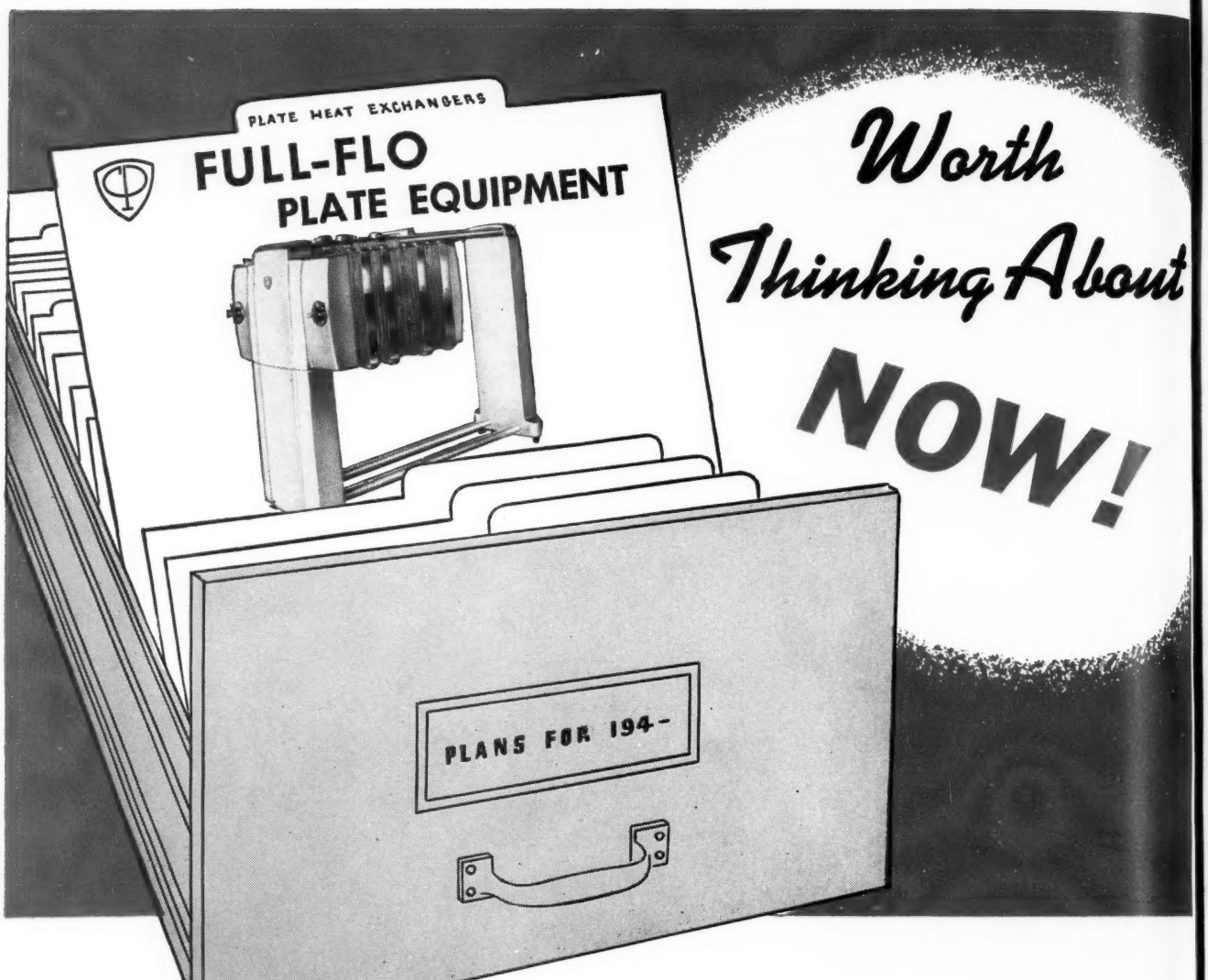
Floods Are Coming

There's a Market For Frozen Milk

Remedies for Slippery Floors

Keeping Drivers' Hours to ICC Limit

McGRAW-HILL PUBLICATION



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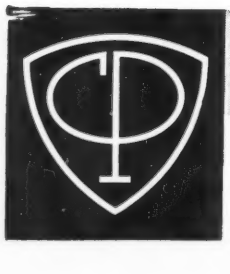

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Wort Decantation 164
Remedies for Slippery Floors 101
DEHYDRATION
Dried Bananas 166
Dehydration the Argentine Way 76
Army Wants Quantity, Quality in Dehydrated Foods 79
QUALITY CONTROL
A Flavorist Views Food Processing 69
Electronic Method for Moisture Tests 81
MATERIALS
America's Agar Industry—Part III 80
DAIRY PRODUCTS
There is a Need for Frozen Milk 78

THE COVER

Foods are frozen in the package with the multiplate froster used by the Birds Eye-Snider Division of General Foods Corp. Carried to and from the freezer on conveyors, the packages are inserted between the plates and then the plates are brought together enough to make firm contact with the container and provide efficient heat transfer. The refrigerant circulates inside the plates.

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FROZEN FOODS—THE PAST, THE POTENTIAL

By H. C. Diehl and C. R. Havighorst 83

The most comprehensive economic study of frozen foods ever put together. Three-color charts show production history and potential (to 1948) for each of 30 frozen fruits and vegetables. The authors analyze the trends, interpret the controlling factors and point to the problems.

SPECIAL FEATURES

Longer Than You Think ..... *By L. V. Burton* 67
A Flavorist Views Food Processing ..... *By E. C. Crocker* 69

MANAGEMENT

When the Floods Come ..... *By L. V. Burton* 72
New High in Labor Problems ..... *By J. A. J. Jones* 82

DISTRIBUTION

Keeping Drivers Within 60-Hour Limit 74

SAFETY

Fires in Confined Areas Involve Special Risks 75
Remedies for Slippery Floors ..... *By Harry E. Gavey* 101

DEHYDRATION

Dehydration the Argentine Way ..... *By H. K. de Weerth* 76
Army Wants Quantity, Quality in Dehydrated Foods 79

PRODUCTS

There Is a Need for Frozen Milk ..... *By Theodore Marcus* 78

MATERIALS

America's Agar Industry—Part III ..... *By C. K. Tseng* 80

QUALITY CONTROL

Electronic Method for Moisture Tests 81

EVERY MONTH

Editorials ..... 67 and 102
The Talk of the Industry 68
Automotive 74
Letters to the Editor 104
New Packages and Products 106
Food Industry News 111
Indicators 134
What Washington Thinks 136
Men, Jobs and Companies 139
Food Equipment News 147
Catalogs and Bulletins 155
Books 157
Patents 158
Food Technology—Abstracts 161
Formulas 169

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Longer Than You Think

"HOW much longer will this crazy situation last?" The question came from sales executives of a large Chicago food manufacturer. We had been talking about the current situation under which it is necessary to deliver substantially less than customers' orders—except when the customer is the government. Though it was a bonafide request for a conjecture, I ducked a definite commitment by saying, "It will last longer than you think."

"How long?"

"At least a year."

"Hmm, that *is* considerably longer than we think."

The outlook, admittedly, is very confusing. A part of the confusion arises from justifiable skepticism about statements from government sources. Another source of confusion arises from the difference between isolated facts and the whole truth. For example, you may be toiling upward on a mountain footpath and find that part of the time it is leading downhill. Nevertheless, if the path is followed, it will lead to the summit.

When we deal with the larger affairs of life, the facts are often so big in themselves as to distort our perspective and cloud the truth. And sometimes the facts—so-called facts—are so huge that we forget to question their validity. For the various preceding reasons, it is apparent that the outlook for raw food supply must be studied with exceeding care. Conflicting statements given out by various government agencies and agricultural groups—even by industry itself—make correct decisions exceptionally difficult.

Take the following quotation from a U. S. Department of Agriculture release dated Jan. 30:

"Australia's ability to continue supplying sufficient foodstuffs to meet its own needs, as well as a large part of the food consumed by the American Forces in the Southwest Pacific and some exports to the United Kingdom, has suffered no serious impairment to date despite the continuation in some parts of that country of one of the severest droughts in its history, the United States Department of Agriculture Office of Foreign Relations reported today. Under reverse Lend-Lease the Commonwealth has been supplying about three-fourths of the food consumed by American Forces in that area."

The report then tells of declines in wheat production, losses of sheep, forced marketing of animals due to feed shortage, a 7 percent decline in butter production, 1 percent decline in cheese production, a predicted decline of 10 percent in mutton, lamb and wool production and a decline of 4 percent for pork production. Even cattle in the northern areas where the moisture is usually ample have been affected, and beef and veal production are expected to drop about 3 percent.

In contrast to the government's optimistic interpretation of the bad news comes word direct from Australia that wheat supplies are so low that the Commonwealth government is limiting the consumption of wheat to 46,000,000 bu., compared with 60,000,000 bu. in the previous year. This report states that there is sufficient wheat in Australia to meet all needs this year. But it does not state that due to the drought the seeding has been reduced below the 1944 seeding that, in turn, was about one-third of the prewar average.

Argentina also has experienced a drought that has brought about a 33 percent reduction in its wheat crop and a 46 percent cut in linseed. This has resulted in a decree forbidding the exportation of linseed, whereas formerly the exportation was 90 percent of the production. It will be remembered that droughts do not affect single crops and permit others to grow without water.

Sir John Russell, one of the world's most respected agricultural scientists, has just reported on French Agriculture, where the average wheat yield in 1938 had been 1,300 hundredweight per acre. In 1941 it had declined 15.2 percent in average yield. In 1942, it had dropped further, to 23 percent less than the prewar average. He summed it all up by saying that after the war is over he fears the whole Continent will be found to be one "vast worn-out farm."

In addition to all the foregoing bad news, we are now learning officially of the bad food situation in the liberated parts of the Philippines.

Italy is hungry. Holland is hungry. Belgium is hungry. Russia is hungry. England, though adequately fed, wants food. Our own State Department says that relief and feeding the hungry in the liberated nations is part and parcel of the war. We have a big military force in the Pacific that must be fed from home if Australia is unable to do it. We also have a much bigger force in Europe that some day must be transferred to the Pacific theater of operations. And that will require an extension of the processed food demand by the government because of the lengthening supply line.

Any way I look at the world food picture, I can see no other conclusion than that it will take longer than one thinks before the food needs—nay, demands—will revert to what we used to consider to be normal.

L. V. Burton EDITOR

The Talk of the Industry

• IF ceiling prices are morally right when demand exceeds supply, then price maintenance should be morally right when supply exceeds demand. But don't kid yourself in the Century of the Common Man.

• OF ALL the many forms of confusion attendant upon food rationing, one in particular is that proponents of rationing claim that it promotes uniform distribution. Ask your wife about that one.

• "RELEASE of bacon rind and strips for the production of unrationed shoes will add approximately 6 to 7,000,000 pairs to annual production," says National Boot and Shoe Manufacturers' Association. Wonder what that will do to gelatine production?

• ONE of the oddities of the times has been the refusal of many deepwater New England fishermen to continue their fishing without tripling the meat ration alloted to them. New Bedford, Mass., boats recently were tied up two days as a protest. Apparently salt water fishermen do not eat much fish.

• WITH Australia proportionately shorter of coal production than we are in the United States, it is a source of considerable wonder that an important Australian government official proposes to invite John L. Lewis, head of United Mine Workers of America, to visit that country. Possibly the purpose of the visit would be to instil Mr. Lewis' rigid discipline into the rank and file of the Australian coal miners, who too frequently strike because of trivial matters such as dusty roads or ants in a lunchbox.

Regardless of Mr. Lewis' impudence in disregarding national necessity, he has always been a stickler for living up to the letter of a union contract with the coal operators. But one is fearful of the ideas he may bring back which may lead to more, rather than less, labor strife.

• LET the fate of Vitaplus, Inc., be a warning to those who would pep up motor fuels by something like the vitamins. After a 17-day trial, the firm was found guilty of using misleading advertising which represented that the pills would decrease gasoline consumption by 20 to 29 percent. Apparently picric acid was the active ingredient of the pills.

• WHAT will happen in a home freezer loaded with good food when the power goes off? The successful answer was provided by a man on the Jersey coast during last autumn's hurricane. He was without electricity for four days in an isolated spot. In fact, it was because of his isolation that he had the answer, for to keep down fire insurance costs, he had provided his home with carbon dioxide fire extinguishers. So when the power was off, he shot a dose of carbon dioxide snow into the freezer, closed the door, and repeated at daily intervals. Nothing spoiled.

• IT is a matter of "vittle" statistics on wars that an Army comprising 5.2 percent of the nation's population consumed almost 8 percent of the country's food supply in 1943. Military activity burns up more energy, requires more food, than civilian pursuits. Then there are more food casualties in combat areas. While an average civilian consumes about 3 lb. of food a day, a soldier needs 5 lb. to sustain him. Better file that data just in case the peace planners don't do so well and you need to know how much food it will take to feed the Army of World War III.

Hors d'Oeuvres

• Since Repeal, malt beverages have netted the Federal treasury almost four billion dollars in revenue. Obviously, Prohibition doesn't pay.

• *Horticulturists are breeding more vitamins into apples to obtain a juice that has as much vitamin C as orange juice. When they accomplish that, an apple a day will keep two doctors away.*

• A local survey indicates that women shoppers who pinch and punch tomatoes and other vegetables ruin enough produce in a year to supply 143 divisions of troops for a week. Which would seem to pose a problem in mistribution.

• *Seattle's City Council recently ordered a fish-oil extraction plant to eliminate the disagreeable odor exuding from its premises, or else. If the factory were as highly incensed as the City Council, the odor would be covered up.*

• To increase food production, Japan is sponsoring a rice crop contest to end in July. The Yanks may pick the winners.

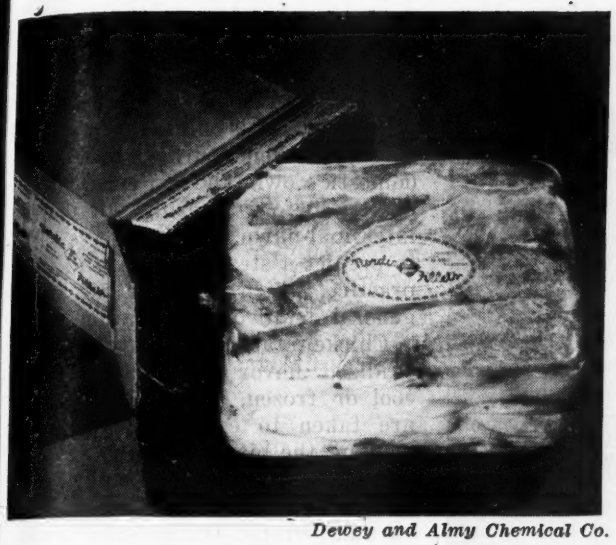
• *Government researchers are working on the transformation of wood into fodder yeasts to supply protein for animals. Next thing you know they will be trying to can tree rings.*

• One of the pipe tobaccos comes in a clever reclosing carton with possibilities for certain dry foods. The top catches every time you close it, yet opens easily, and it's all done with paperboard. A piping good package principle.

• *La Guardia recently added byproducts Monday to New York's meatless Tuesday and fish Friday. So Monday is an offal day in New York.*

• Management might well borrow from the Germans the idea of explaining problems to employees so that they can suggest solutions. But there's the little problem of who's to tell management what the problems are.

• *Some Illinois motorists have found to their dismay that the dogs like their soybean license plates. So the number is up for another use of the versatile Chinese bean.* F. K. L.



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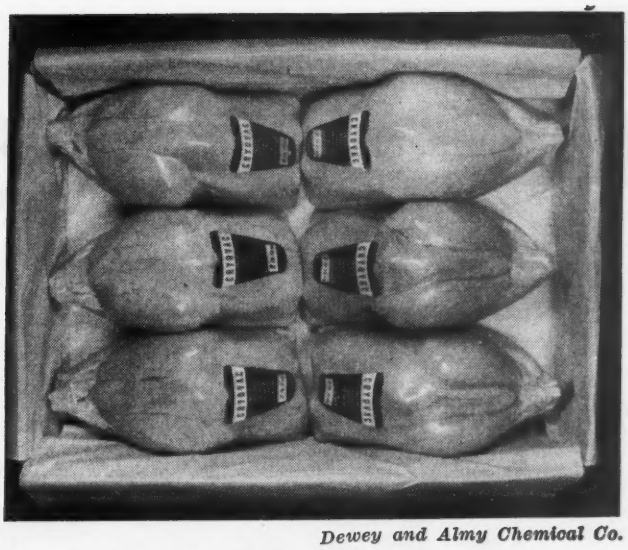


Dewey and Almy Chemical Co.

Packaging poultry and fish in Cry-O-Vac bags excludes air which would develop oxidized flavor.

Arthur D. Little, Inc.

E. C. Crocker, the author, who with L. F. Henderson developed the odor classification system for which working standards are shown here. By this system, which divides odors into four components, each of eight degrees of intensity, any odor can be described by a 4-digit number.

A FLAVORIST* VIEWS Food Processing

Processors must use skill if they are to meet the demands of present-day taste-educated consumers. Here are inspired, but practical, pointers on what to do, and not do. They are of value to every food manufacturer

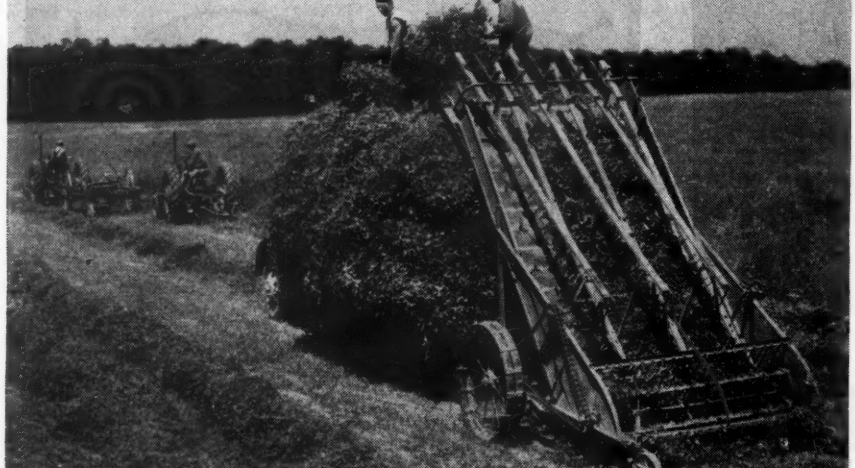
By E. C. CROCKER
Arthur D. Little, Inc., Cambridge, Mass.

PEOPLE eat foods, rather than absorb nutrition, and the foods they choose to eat are those which appeal to the senses. The preferred foods must look normal as well as attractive, and have good natural flavor. The public recognizes high quality today, great numbers of people being accustomed to the flavor of good foods, including prime fresh-picked vegetables from home gardens and excellent frozen foods. Processors must use skill if they are to deliver to the present educated consumer food that not only has acceptable flavor, but has repeat-performance appeal as well.

The aromatic part of flavor—the part that travels through the air to start the saliva flowing, perhaps even before the food is in sight—is originally present in foods in exceedingly small quantities. It is very sensitive to physical and chemical treatment, and unless carefully guarded, may be lost. Sweetness, sourness, saltiness and bitterness (the tongue-taste elements of flavor) are all much more resistant to loss or damage than is aroma. So are the bite or burn of spices, and the textural or tooth-appeal elements such as smoothness merging into graininess and toughness into tenderness.

For most practical purposes, guarding the precious aroma guards all of the other elements of flavor. Furthermore, whatever protects aroma to a large extent also protects color and vitamins, for all three of these food components are sensitive to the same

*Since the dictionary lacks a word for one whose profession deals with flavor, the term "flavorist" is hereby offered. Mr. Crocker follows this profession and will shortly publish through McGraw-Hill a book treating the whole subject of flavor.



Birds Eye Frosted Foods

For the Birds Eye pack, green peas are mowed, immediately loaded and then transported to nearby vining stations. The peas are harvested, shelled, cleaned, graded, packaged and quick frozen within two or three hours after being cut.

kinds of destructive agents. When processed food smells good, it has been well kept, and people like it.

Vegetables of Better Flavor

The frozen foods industry was built on quality, with meticulous care used in the choice of the most suitable varieties of each item, raised especially for freezing. A trend toward frozen foods of lower quality has set in, and unless reversed this will soon react not only against the companies that have the lower standards, but against the industry.

The best varieties of foods for good flavor after processing are not always the ones easiest to raise, because of plant diseases, unevenness of ripening of the crop, low yield or other agricultural considerations. Varieties that yield inferior flavor on processing are all that are available to most food processors who do not raise their own. Peas illustrate this matter conspicuously. Only the relatively flavorless smooth "Alaska" pea is commercially available. There is no commercial supply of the sweet "wrinkled" type, which is the pride of the home gardener.

The soybean has failed to get very far as yet in the American dietary because its distinctive flavor is not liked. Products containing more than a small proportion of soybean usually are eaten but once, although high-grade pancake mixes containing soya flour appear to be an exception. However, the nutritive value of soya products is so high that even very small proportions, such as 5 to 10 percent, are desirable in many dry food mixtures, proportions so low as to be unobjectionable in flavor. The American public must be introduced to soya flavor very carefully, by way of small proportions. Perhaps a long-range method would be to include small amounts of soya flour in baby foods. This would get the next generation accustomed to it, so that a few years hence there would be a good market for soya products.

Improving Flavor of Meat Products

Animal foods are being handled better all the time, especially in the large packing plants, but there still remain areas of the industry where improvement is in order. Fortunately, the myth of the necessity of allowing the "animal heat" to escape before refrigeration has been pretty well discarded except in remote establishments, and chilling shortly after the kill does much to preserve quality, including flavor.

Poultry suffers greatly in flavor when an appreciable time interval elapses between killing and evisceration, particularly when there is not immediate chilling. Sulphury-smelling ingredients from the intestines diffuse into the tissues of the bird in appreciable amount in a matter of hours when the poultry is not refrigerated, or in a few days at just above freezing. Transfer of this unpleasant flavor is much retarded by a solidly frozen condition. While this type of "gutty" or "gamey" flavor is relished by some sportsmen in pheasants, it is highly objectionable in chickens, turkeys and other domestic fowl. The evisceration of poultry before freezing eliminates intestinal-flavor transfer. It is safe to predict a steady increase in this practice, which is still a far from general detail of preparation.

Chicken fat is prone to develop oxidized flavor while in storage, cool or frozen, unless great pains are taken to exclude oxygen, by packing the birds well, one against another, by having them glazed over with ice, or else encased in vacuum wraps. Oxygen-free packing is also of great importance with fish, and even with some meats.

The handling of fish before marketing is still carried out under relatively primitive conditions in some Eastern ports, due to local customs. The fish are pierced by forks during transfer, infecting the flesh with the bacteria present on the slimy outer surface. It is to be hoped that practice will improve in this as in many other matters, to correspond, for example, with the gain obtained through prompt icing of the fish in the boat. Otherwise, the more sanitary, hence better-flavored, imported fish may replace a considerable part of the fresh fish in most markets.

The flavor of fish, like that of eggs, depends upon "freshness," but this freshness in turn is not properly measured in simple elapsed time but in terms of the thermal and sanitary history since the fish was caught. As fish ages for a matter of hours at room temperature, the pH rises notably, due to evolved amines; meanwhile the flavor deteriorates moderately. Later, foul sulphides are evolved, and there is rapid flavor deterioration.

Processing for Best Flavor

Food processing comprises several operations for most foods, in addition to such gross mechanical steps as trimming, peeling and pitting, depending upon the product and process. And nearly every one of these operations affects the flavor, either directly or later during the storage life.

The roasting of certain seeds develops flavor directly, as with chocolate, coffee and peanuts. The roasting, followed by grinding, blending and flavoring, is sufficient

processing for chocolate, which is a self-sealing solid product, stable under most conditions. Not so with coffee, which keeps its flavor poorly when exposed to the air, necessitating vacuum packing or refrigeration for retention of the complete flavor for more than a few days. A sizeable industry is developing for making dry extracts to be used in the convenient preparation of beverage coffee. In this manufacturing operation, freshly roasted and ground coffee is extracted and the extract is quickly dried to a flaky mass. Much aroma is sacrificed during the drying and the flavor remaining is altered, but sufficient taste remains to satisfy many people, especially after they have found that much of the cheer and lift are retained.

Great improvement has taken place in recent years in the heat-processing of canned foods, especially of liquids and canned peas. Perhaps the greatest gain from the flavor standpoint for these types of foods is in the use of the "high-short" process: high temperatures employed for very short periods of time, followed by rapid cooling. The temperatures used, which frequently are much above the boiling point of water, necessitate pressure chambers. All bacteria and spores are killed by the drastic thermal shock. Meanwhile, there is a minimum of damage to flavor. Clever engineering is needed to develop high temperature rapidly in every part of the food, and afterward, to withdraw the heat as rapidly.

With liquid products, heat processing can be done in seamless metal tubing, with exposure to the heat often limited to a matter of seconds. When sterile liquid is run into sterile containers, it is done in a bacteria-free chamber. Sealing is frequently done in a flash atmosphere of steam to displace the oxygen in the top of the can. Several recent patents by C. O. Ball describe how even solid foods in discrete particles without juice, such as peas, can be sterilized with extreme rapidity by steam and then sealed in an atmosphere of steam in the can.

Fruits and vegetables are frequently cooked in the cans, though nearly always with considerable change of flavor. Some people may prefer the flavor of canned pineapple over that of the fresh fruit, but probably few prefer preserved strawberries over fresh. At least they are different. Canning is not to blame, however, for the poor flavor of the large yellow "pumpkin" peaches that look so beautiful in the sauce dish, for canned peaches of fine flavor can be and are being produced.

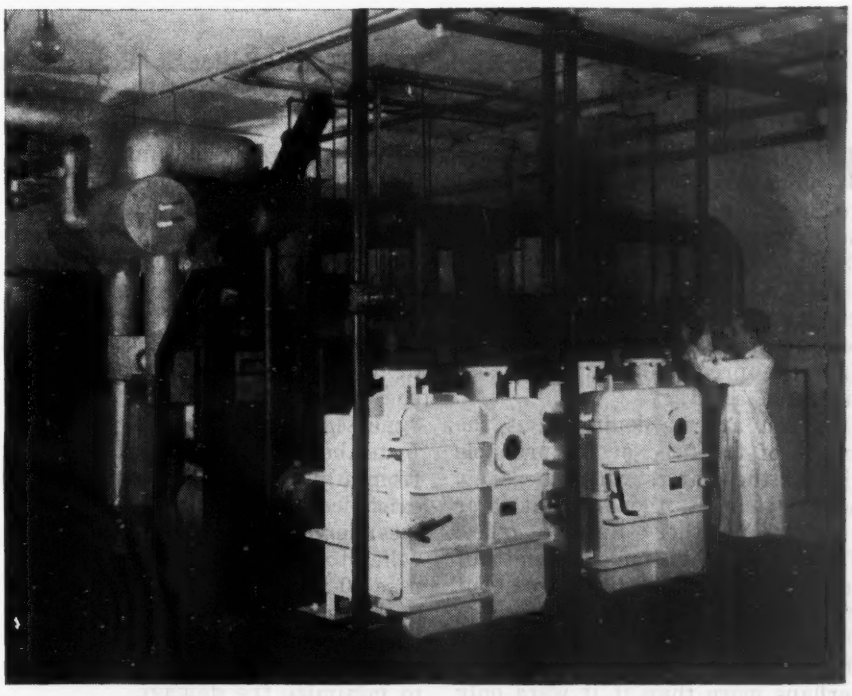
More Thorough Blanching

Blanching is a type of heat treatment that must be applied to vegetables that are to be dried or frozen. For this purpose it consists of a short cooking operation designed to destroy the enzymes which otherwise would be active in the frozen or the dried state. These enzymes are chemicals of great importance and activity for carrying out some of the life processes of the vegetables, at which time they are either controlled by counter-enzymes or are sealed away in the cells awaiting call. When the plant dies the enzymes may still be active and are then destructive to color and flavor. If any trend is indicated for the near future, it is toward more intensive and thorough blanching, in some instances full cooking, before the food is frozen or dried.

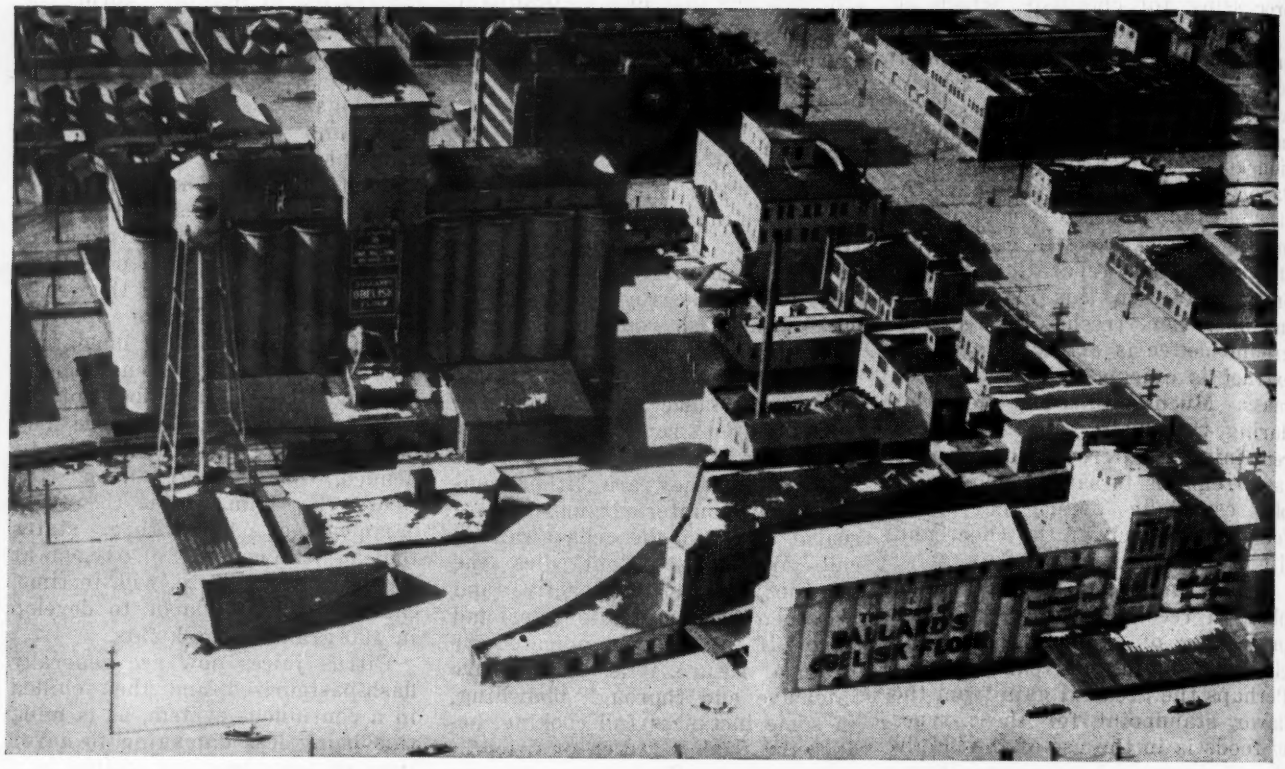
The dried milk industry has become large and important. Roller-dried whole milk and nonfat milk solids and spray-dried milk are widely used in baked goods, candies, beverages and ice cream mixes. Low-temperature vacuum-drying also is under development. The flavor of reconstituted dried milk generally is not equal to that of fresh milk but is satisfactory in baked goods, and if the powder is not too old, it is accepted with reservation in beverage form. Experimentation is very active in improving the flavor of reconstituted beverage milk. Different manufacturers have their preferred equipment and temperatures for the flash pasteurizing of milk, each aiming to reduce bacteria and inactivate the enzymes of the product with a minimum development of "cooked" flavor. The packaging of the final product is of the greatest importance, and there apparently is an opportunity for much further improvement. Even vacuum packing in metal cans does not get rid of all oxygen, and there may be other factors, still not comprehended, that damage flavor. Dr. George E. Holm, of the U. S. Department of Agriculture, states that as little as 1 c.c. of oxygen, at atmospheric pressure, will, in time, cause "oxidized" flavor to develop in 100 grams of milk fats.

Citrus juices now are generally flash-pasteurized and then chilled in a continuous system, as is milk, this being less damaging to flavor than pasteurizing and cooling in a can. Any continuation of heating beyond the brief necessary pasteurizing period results in notably more "cooked" and less natural flavor. Apple concentrate of fine flavor and keeping properties is now being made by distilling off the aroma of apple juice rapidly and setting it aside. The residue is then concentrated to a thick sirup to which the aroma is added. When

(*Turn to page* 170)



Vacuum drying equipment of National Research Corp., which is suitable for low-temperature desiccation to protect quality of heat-sensitive foods.



Here's what can happen. In the flood of 1937, the plant of Ballard & Ballard Co., Louisville, Ky., was surrounded by water several feet deep.

WHEN THE FLOODS COME

This winter's heavy snows mean floods when the warm rains come. So you better take a page from the sad experiences of others and plan what you can do to save your factory, equipment and supplies from preventable damage. Here are some suggestions

By L. V. BURTON., Editor of "Food Industries"

FLOODS are coming, if they have not already begun by the time you read these words. It does not take a prediction from the Weather Bureau to make this sort of forecast. The depth of the snow on the ground after the past unusual winter is all that anyone needs to know to predict floods with considerable accuracy.

If you are in doubt about the extent of the flood or the probable rise of the waters when the snow begins to melt, then consult your nearest Weather Bureau office. There may be no unusual depth of snow in your immediate area, but if there is a huge accumulation on the watershed or drainage area, the melting of it will affect you, perhaps more than if it were only a mile away, especially if it is far upstream from your location.

While there is nothing you can do to alter the height of the winter flood waters when warm rains come, there is much that you can do to minimize the damage to plant, equipment and supplies by proper foresight and energetic action.

Some of the worst flood damage to food plants has occurred in the past to companies whose officers "guessed" they would not be affected because they were miles away from a big river. They ignored the existence of nearby creeks that meandered lazily through a flat valley to the river. When the water rose 40 feet in the river, the water backed up the creeks and filled the lower floors of plants which had made no preparations whatsoever to minimize the damage.

A good plan is to purchase a 10-cent contour map of your region from the Coast and Geodetic Survey and study out what could happen to your place of business if the principal watercourses experienced floods of 5, 10, 20, 30, 40 and 50 ft. The Weather Bureau can predict flood crests with surprising accuracy, once the melting begins in earnest. Follow their advance, but play safe and use your own thinking apparatus.

Flood waters can enter a plant through doors, windows, toilets, cracks in basement walls, passages for pipes and wires and other openings. These "other openings" are the ones most likely to give you trouble after you think you have done everything to keep the water out. Forgotten floor drains often covered by supplies or machinery can admit just as much water and allow just as much damage as any

open pipe pouring a stream of water into the plant. If the basement is not tightly concreted and the flood remains high for a long time, the amount of water that can seep up through the soil is nothing short of astonishing.

Another thing to think about is the strength and height of levees that may exist. If you are in doubt about their ability to hold back the water, it is better to act promptly at the first sign of danger than to wish you had. A thousand dollars spent in this form of insurance (moving out supplies and electrical equipment) is far less costly than the expense of reconditioning the lower floors of the plant and the added cost of a prolonged shutdown.

Beware of the reassurance of old-timers about the maximum flood heights. There is always a chance for a new record. At Springfield, Mass., during the floods of 1936 on the Connecticut River, the manager of the big A & P warehouse listened to the tales of the old-timers, maintained a healthy skepticism, and finally began to study the river itself—for it was still rising. He drove a series of stakes into the ground above the water, each stake being 6 in. higher than the preceding one. Then he measured the *increase* in the height of the water *at regular hourly intervals.* When he plotted these on coordinate paper, he could see that the rate of rise was continuing and not tapering off. If the same rate of increase were to continue for 36 hours, his basement would be flooded. If it continued for 42 hours, his first floor would be flooded. Since it would require every minute of the projected time to evacuate these two floors of the warehouse, he wisely decided to start the move. The last trainload of merchandise was pulled out in the nick of time; the water had risen so high that it extinguished the fires in the locomotive! But he saved better than $100,000 worth of groceries.

Flood Water Is Muddy

While it is easily apparent that merchandise and supplies should be taken from the danger zones, there is much equipment that is not so easy to move. Electric motors, switchgear, automatic control instruments, wooden packing tables and wooden conveyor structures will be damaged seriously by water. And don't forget that flood waters are always muddy waters. Grit and sand will be deposited in and on everything. Every machine that has been flooded will need to be completely cleaned, overhauled and adjusted after the waters subside. And then there is the matter of sanitation after a flood. Flood water is full of sewage. Epidemics of typhoid fever and other intestinal disorders are common after a flood. Boards of health have vast emergency powers and usually insist on disinfection of all premises after it is possible to enter them. Sometimes they have so much territory to cover that weeks are required to complete their inspections and grant approvals. A flood may last only a day and cause a 4-week shutdown.

Some men think that it is a relatively simple matter to bake the moisture out of soaked motors, that this can be done while the gang are scooping the tons of mud out of the factory. But baking facilities in a given city usually are limited, and if there are thousands of motors to be baked out it is a foregone conclusion that somebody will have to wait a few weeks.

Plans that Have Failed

During another flood period, FOOD INDUSTRIES made a careful study of the preparations for high water that did no good whatsoever, or that were ineffectively carried out, or that should have been done differently. Of all the failures, the forgotten floor drain in the basement, the tidal trap that did not function or the toilet up through which the water poured were among the commonest. And here are other failures that were noted:

Sump pumps that would not work in the emergency because the motors were short-circuited by water.

Plugs in basement floor drains that were forced out by the pressure of the water below the plug.

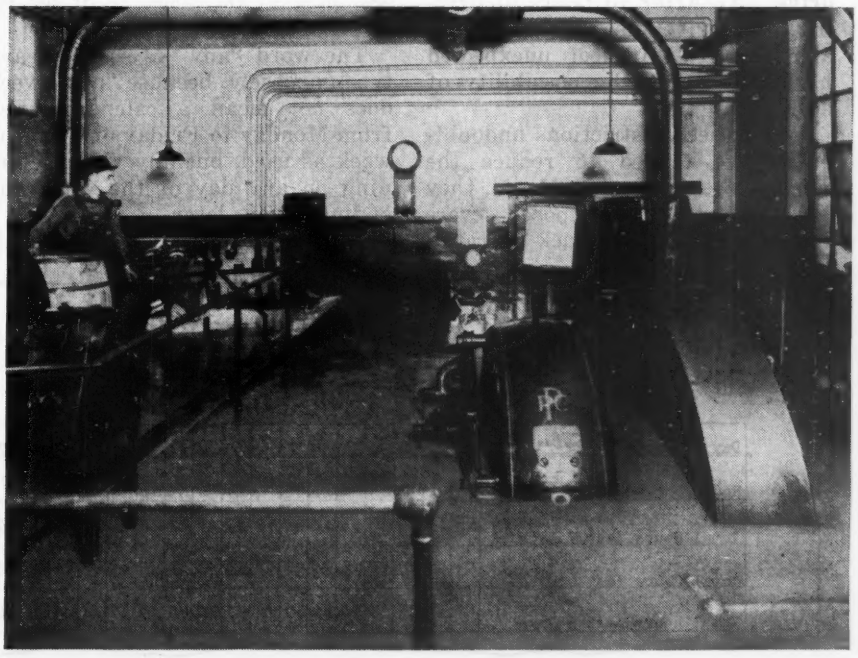
Damage to machinery by objects floating around. This was especially bad in a carbonated beverage plant where a truck load of empty gas cylinders were overlooked. It was "supposed" that they would not float. But float they did, and each one was a miniature battering ram that raised havoc every time it struck delicate machinery. It is a mistake to assume that flood waters are quiescent, even inside a factory, for frequently they are turbulent. In one plant a heavy work bench floated and smashed expensive machinery beyond repair.

Loose empty bottles, even milk bottles, float and break in unbelievable numbers.

Metal containers, whether they float or not, may rust beyond reclamation.

One plant built a high platform on which it placed all the sugar in stock. Though it was believed to be out of danger, the water reached a height of about an inch above the platform. All the sugar dissolved from the bottom layer of

(*Turn to page* 174)



In the flood of 1936, electrical generators in the power plant of Peters Packing Co., McKeesport, Pa., were put out of operation. After the muddy waters receded, heat was applied to "bake out" the windings.

Keeping Drivers Within 60-Hour Limit

The ingenious card described in this article will help the dispatcher to keep the truck driver's working hours within the seven-day limit set by the ICC

INTERSTATE motor carrier distributors of food products, whose drivers are limited to 10 hours of driving time in any 24-hour period and to 60 hours in any consecutive period of 168 hours, or seven days, will find the ingenious time record cutout card, illustrated on these pages, to be of value in preventing violations of such regulations.

These regulations were set up by the Motor Carrier Bureau of the Interstate Commerce Commission as a means to insure greater safety in the operation of motor vehicles on our public highways. They were based on the assumptions that: (1) No driver should be allowed to operate a motor truck on the open road unless he had 8 hours rest previous to the time he started to drive. (2) After 10 hours of driving, the driver is not fresh and alert enough to meet unexpected hazards without the possibility of accidents.

While these restrictions undoubtedly have tended to reduce the number of highway accidents, they have unfortunately imposed severe handicaps upon the truck operator, especially in these days of driver shortages. Truck routes and road runs may be laid out to be completed within 10 hours' driving time. However, 60 hours maximum weekly working time means that when a driver reaches 60 hours he must be laid off and another driver substituted, even though the route or run is not completed. Getting the other driver and keeping him on the payroll are the problems facing the truck operator.

In many cases, this means a five-day driver week with a cutoff on the sixth day to keep within the 60-hour limit. Then when another driver is employed on the sixth day, additional work must be found for him on the other days of the week in order for him to earn enough take-home pay to remain satisfied. Otherwise, he will resign to accept another driving job where he can work a full week.

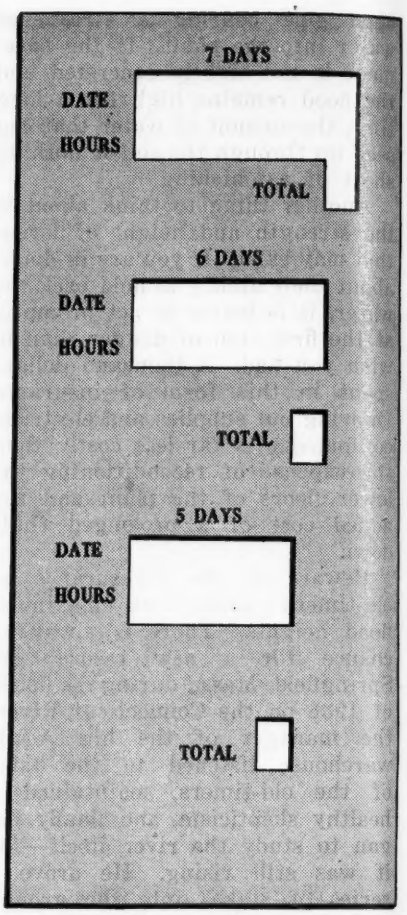
Rule 3 of Part 5 of the Motor Carrier Safety Regulations, Revised, states on page 73 that:

"No carrier subject to these regulations shall permit or require any driver in his employ to remain on duty for a total of more than 60 hours in any week of 168 consecutive hours beginning at the time the driver reports for duty."

The word "any" is set in heavy type purposely, because "any" week does not mean a calendar week from Monday to Friday or a payroll week as used, but any week beginning on any day of the week and ending 7 days later.

Furthermore, section (*b*) of Rule 6 on page 77 of the same booklet states that:

"If a driver is permitted or required to drive in excess of 10 hours in the aggregate in any 24-hour period . . . a report must be made immediately to the Commission, addressed to the district office of the Bureau of Motor Carriers of the district in which the carrier's headquarters is located, and such report shall contain a full and correct statement of the conditions which necessitated the longer period of driving."



By placing the open portion of this cutout over the five, six or seven days in question on the record of hours worked, the total number of hours worked during that period will show in the slot marked "total."

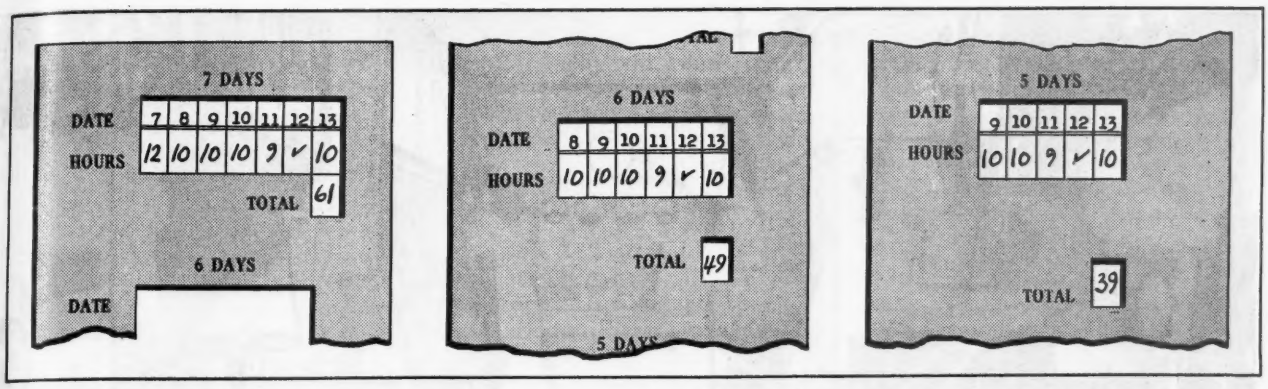
Form 118

RECORD OF HOURS WORKED

TRUCK DRIVER John Jones LOCATION Philadelphia, Pa.

Day of Month November '44	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Hours Worked Today	12	9	9	10	✓	8	12	10	10	10	9	✓	10	8	9	9	10	9	✓	9	10	12	✓	9	11	8	10	9	9	11	
Total Hours Last 7 Days 59	59	59	60	58	58	56	60	58	59	60	59	59	61	57	56	55	55	55	55	56	56	59	50	49	51	51	52	51	48	59	
Total Hours Last 6 Days 50	50	51	48	58	48	48	48	49	50	50	59	51	49	47	46	45	45	55	47	46	47	50	40	40	51	42	42	39	48	50	
Total Hours Last 5 Days 41	41	39	38	38	40	36	39	40	40	40	41	39	39	37	35	37	46	45	37	37	38	40	31	40	42	40	30	47	47	47	

Here is the form used to record the hours worked by each driver each day of the month, with separate lines for the total hours worked in the last five, six and seven days. The truck operator thus can more easily keep his drivers within the 60-hour working maximum for "any" seven-day period, as required by ICC regulations.



Here is the seven-day opening in the cutout card showing 61 hours for the period.

The six-day opening over the same period shows that only 11 work hours remain.

Similarly the five-day opening indicates 21 hours left for the last two days.

Continued violations are subject to penalty, and the use of "any" week of 168 consecutive hours means that one violation on one day may result in more than one weekly violation.

For example, if a driver worked 12 hours on a Monday, the violation for the week beginning Monday might be limited to one if he worked only 8 hours the next day, and 10 hours each on the next four days. But if he worked 10 hours on each of the next four days and 8 hours on the sixth day, this might result in four violations for the weeks beginning on Tuesday, Wednesday, Thursday and Friday.

It is to prevent such violations that the cutout card shown here is most helpful. It shows how many hours can be worked on the last day and the last two days of any week and still keep within the 60-hour maximum.

In operation, the Record of Hours Worked gives on the top line the hours worked each day. By continuing the record from the previous month, the total hours worked in the last seven days, the critical period of 168 hours, are shown to each day of the current month.

By placing the card over the Record of Hours Worked sheet, with the opening headed "7 days" over the days of the month, the total hours worked in the week ending the last day shown may be read directly in the corner of the main card opening at the bottom right. In the example shown for the week ending November 13, there is a violation of 1 hour in the seven days ending on that date.

Then by placing the notch of the cutout card headed "6 Days" over the six days ending November 13, the 49 shown in the separate total opening indicates the driver can only work 11 hours the next day and keep within the 60 hour limit.

The third position of the cutout card shows that the 39 hours worked in the first five days of the week allows 21 hours to be worked in the last two days of the week.

The law provides certain allowances for emergencies and certain exceptions for farmers and salesmen who devote less than 50 per cent of their time to driving. The reporting of overtime driving in (*b*) of Rule 6 as previously outlined is not applicable to any private carrier of property. Certain other exceptions are made when the vehicles and drivers work wholly within a municipality.

Fires in Confined Areas Involve Special Risks*

Danger of poisoning or suffocation from gases or lack of oxygen requires protection for fire fighters

FIRE brigades of many businesses and industries might profitably be given special instruction in an important, but often overlooked, problem—that of fighting fires in confined spaces, such as basements, cellars, pits, manholes, vaults and small compartments generally.

The important feature of this problem is that it involves life-hazards that exist to a far lessor degree with fires in places where there is ample ventilation.

These hazards originate in the fire itself, and go beyond the heat and flame. Every fire, especially when burning where the ventilation is poor, generates large volumes of the deadly carbon monoxide. And other poisonous gases, such as hydrogen sulphide and hydrogen cyanide, also are frequently produced. In consequence, it is always dangerous to breathe smoke and fire gases, and special care must be taken to avoid this danger when the fire is in a confined space.

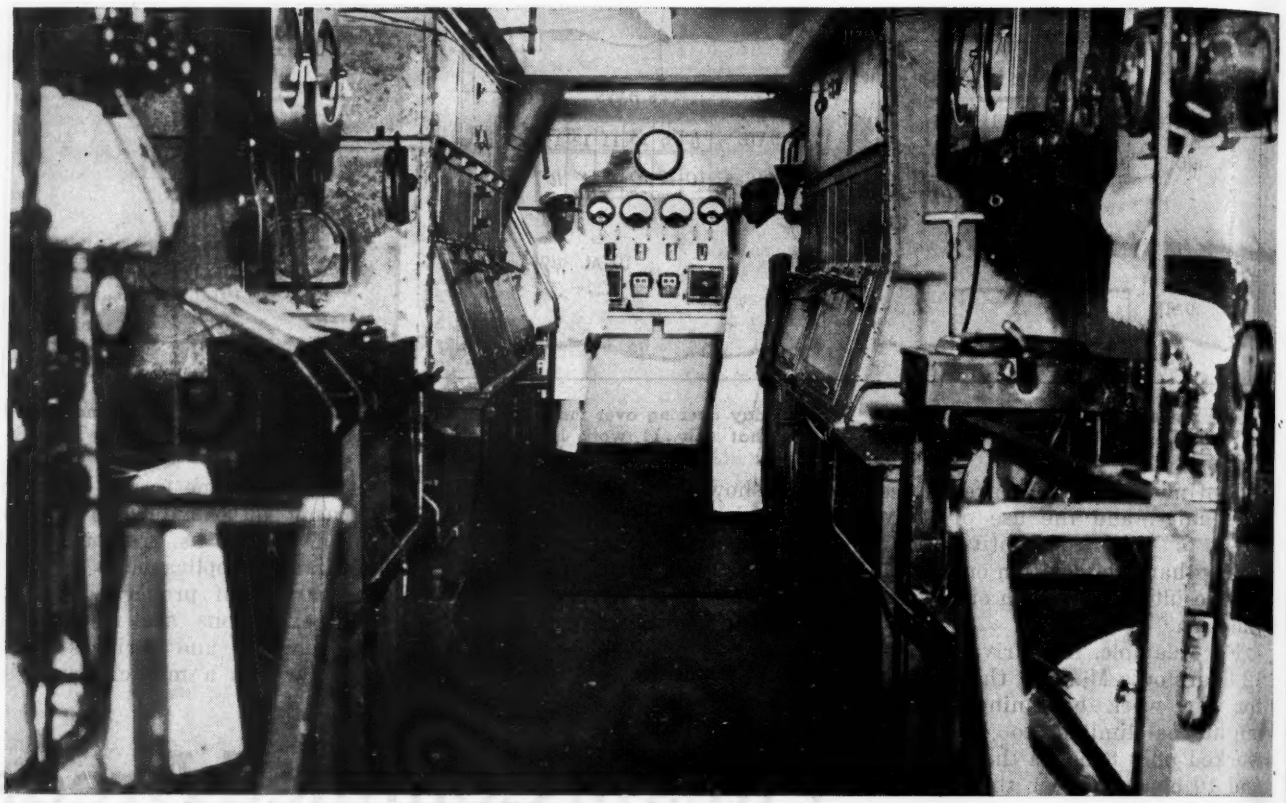
In fighting fire in a confined space, therefore the following rules should always be observed:

1. Fight the fire from outside the space wherever possible, standing where there is fresh air and discharging the extinguished agent on the fire through a doorway or other opening.

2. After the fire is out, do not enter the space without respiratory protection until it has been thoroughly ventilated. Some spaces, such as manholes, may have to be ventilated mechanically before they are safe to enter.

3. If a small unventilated space must be entered when a fire is burning in it, or immediately after the fire is extinguished, gas masks must be worn. The all-service type of mask, which protects against carbon monoxide as well as other fire gases, may be worn when the atmosphere of the space is known to contain enough air to support life. But if there is reason to believe that the atmosphere is deficient in oxygen, some type of oxygen breathing equipment must be worn by those fighting the fire.

*Prepared by the Safety Research Institute, New York, N. Y.



Two dehydraters installed side by side, with common instrument and control panelboard. One man can operate the two, and multistage dehydration is attained by operating the units in series.

Dehydration the Argentine Way

Something different in dehydrater design has been developed to meet urgent wartime food demand. Cooked meat with 54 percent moisture is dehydrated to 7 percent moisture in gyrating perforated drum

By H. K. de WEERTH, Consulting Engineer, Buenos Aires, Argentina.

WARTIME'S enormous demand for foodstuffs, together with the problem of transportation to Europe, led us in Argentina to rapidly expand our facilities for dehydration. The demand came so suddenly and was so urgent that insufficient time was available for the orderly development of methods and equipment.

In view of these circumstances, we found ourselves compelled to use existing equipment, with whatever modification could be quickly adopted, to dehydrate meats. In our particular case we felt that we could best meet the basic requirements for successfully dehydrating meat by equipment that would provide (1) continuous agitation during the process, (2) sufficient and predetermined volumes of heated air, (3) the proper distribution of air during the process.

As is now pretty well known, at the beginning of the process, when meat contains a maximum of moisture, the temperature must be raised fast enough to arrest bacterial development. And throughout the initial stage of dehydration, the temperature should not fall below the minimum required to prevent bacterial growth. Therefore, at this stage when the surface moisture is being removed, the maximum volume of air is required. This air should have a high enough heat content to replace the heat given up by the product. It is the practice here either to recirculate part of the air or to humidify it by atomizing water into the air stream. A maximum of agitation also is desirable at this stage to increase the contact between the product and the air.

As in dehydrating vegetables, at the final stage of the meat dehydration process the air temperature should be as low as practicable to prevent casehardening of the product.

The problem that the writer attempted to solve was that of dehydrating cooked meat with a moisture content of 54 percent and a fat content of 30 percent on a dry basis. The goal was to dry the meat to a final moisture content of 7 percent and have no more than 12 percent of fines passing through a 1/16-in. standard mesh screen

after defatting with petroleum ether. Also, a bacterial count of not more than 10,000 per gram was to be achieved.

Considerable experimenting was conducted with a small pilot plant, and the unit shown in the drawing was developed. The through-draft principle was adopted. Agitation of the product is obtained by occasionally gyrating the perforated drum, which is equipped with fingers, alternately to the right and left. Distribution of the air proved to be no problem. The temperature and humidity of the air are easily controlled, and no trouble is experienced in adjusting these as the drying progresses and the demands change.

Operation

The dehydrator consists of a perforated drum (1 in the drawing) on the outside of which is welded a screw conveyor (12), this drum, with its screw, are in a perforated tank (2). The thickness of the layer of the product to be dehydrated is the distance between the outer periphery of the perforated drum and the inner periphery of the perforated tank. This is also the depth of the screw conveyor.

With this arrangement, the product is a band of meat (10) between the perforated drum and the perforated tank. This reduces the chance that the wet meat will form into rolls, as is the case with some methods.

The air enters the center of the perforated drum (8). There being no obstructions and the dehydrated layer being even, the air must pass in all outward directions in a uniform flow. In this manner, dehydration proceeds evenly throughout the batch at a controlled rate.

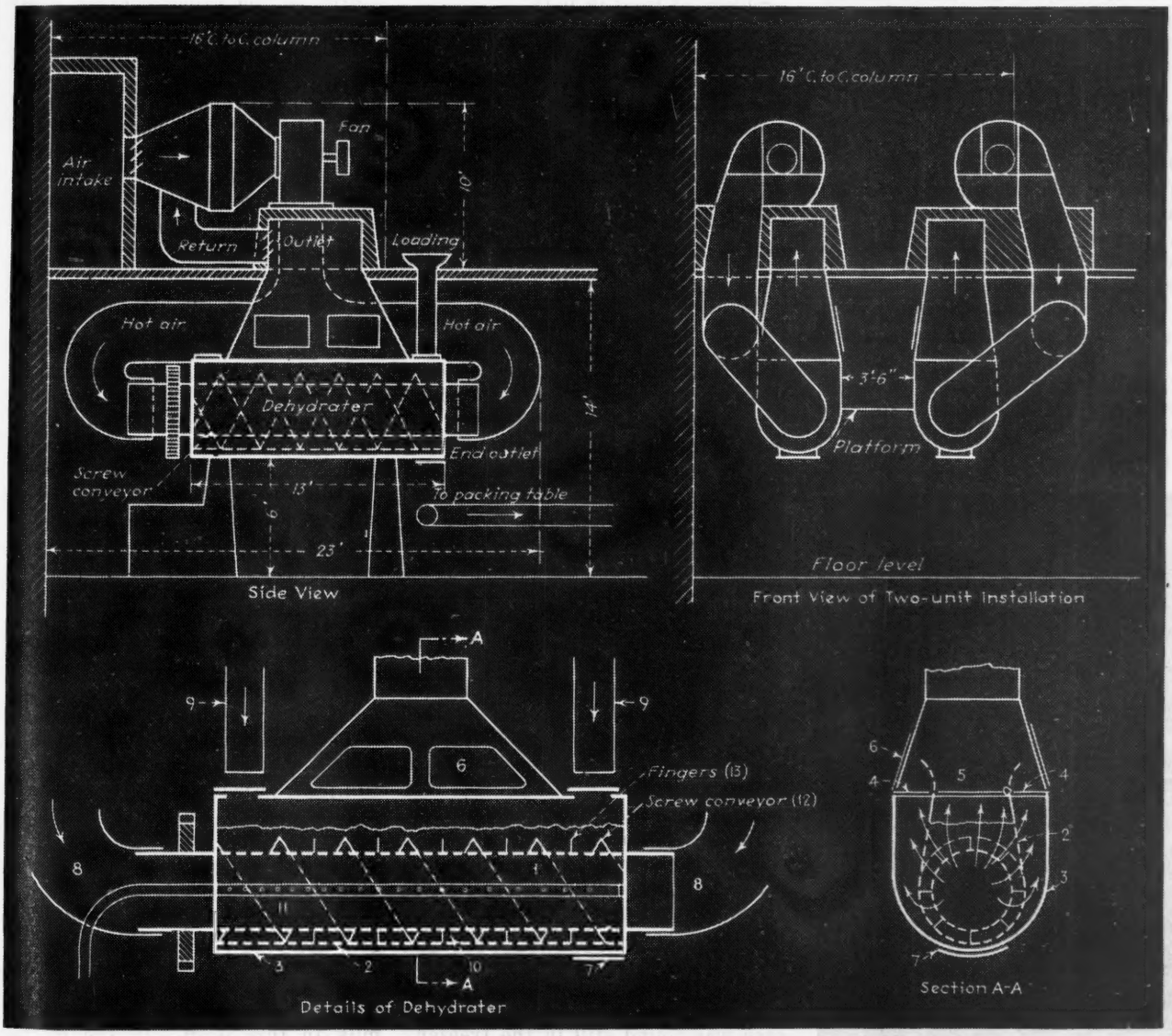
The product is loaded by gravity through a chute at one end. During loading, the perforated drum is rotated, pushing the product forward. When fully loaded, the drum is stopped, the machine closed and dehydration started.

Between the flights of the conveyor, the drum is studded with "fingers" (13). These agitate the product during dehydration as the drum is gyrated to the left and right through part of a revolution.

The air volume is controlled by the use of dampers and also by variable-speed drives on the fans.

Humidity of ingoing air is controlled by recirculating part of the air in the process. Humidity and temperature are controlled manually, one man attending to two dehydraters.

The meat to be dehydrated is first cut into 2-in. cubes. Then it



Schematic drawing of the gyrating-perforated-drum meat dehydrater developed in Argentina. In the detail drawings at the bottom, (1) is a perforated drum, (2) perforated tank, (3) housing serving as outlet air duct, (4 and 5) registers for equalizing pressures, (6) inspection doors, (7) discharge door, (8) hot air from heaters, (9) loading chutes, (10) space for product, (11) perforated steam pipe for blanching, cleansing and sterilizing, (12) screw conveyor and (13) fingers.

is brought to a temperature of 212 deg. F. and cooked for 35 minutes. It is permitted to cool to improve its cutting qualities and is hashed through a plate with 5/16-in. round holes producing about a 3/16-in. cut.

To load 3,000 lb. of cooked meat takes 7 minutes, and unloading requires 4 minutes. Cleansing and sterilizing, which is done once every 24 hours, takes only a few minutes. A perforated steam pipe placed along the axis of the perforated drum permits convenient application of steam for sterilizing.

It has been found that the construction of the dehydrater lends itself to production in series, which favors low first cost. Operation is economical, inasmuch as one operator can conveniently manage two units from a central control.

In controlling the quality of the product, samples are taken during the process, the design of the dehydrater being such as to make this convenient.

Due to the successful operation, a second unit was immediately ordered, and so far more than 3,000,000 lb. of dehydrated beef (the equivalent of 32,000 head of cattle) has been produced with the two dehydraters. All of this production has passed the specifications of the British government.

If this unit were to be used for fruits and vegetables, blanching probably could be done inside the dryer. The dehydrated products also could be cooled in the unit by shutting off the steam and circulating outside air.

Assembled dehydrater, complete except for blower, heat exchanger and controls.

There Is a Need For Frozen Milk

Men overseas want fresh-tasting fluid milk, and frozen milk has a probable postwar market on ships

By THEODORE MARCUS
Massachusetts Dairy Laboratories, Roxbury, Mass.

MILK to drink ranks high on the list of everyday things that the men miss overseas. And milk to drink, for those outside the continental limits, has been receiving much attention from those responsible for food supplies. Perhaps frozen whole milk will solve the problem, at least in part.

This is not a problem of nutrition, since the food factors involved can easily be replaced in the diet. It is largely a morale factor. The product must look and taste like fresh market milk. It must also have the texture of the fresh market milk.

Reconstituted milk from whole milk powder, or from skim milk powder and butterfat, has been tried. The "mechanical cow," recipient of much attention, goes a long way in the right direction but still falls short on flavor. More recently, a method of freezing evaporated milk was presented to overcome the objections to the flavor of the reconstituted milk. But so far no milk processed to reduce its volume has been found to taste "fresh."

Freezing whole fluid milk presents no advantages in space saving, while it increases the refrigeration requirements, but it does offer some hope of meeting taste standards. And the place where palatable fluid milk could be of most value, on hospital ships, is also one place where refrigeration is available.

Working on this problem, Lt. Norman Rabinovitz of the Navy Supply Department in 1942 placed a case of frozen milk, in paper pint containers, in the refrigerator of a freighter bound for Iceland. No word was received as to the condition of the milk on arrival. However, in 1944 a duplicate of this case was found still in the freezer. The containers, furnished by American Can Co., were in excellent shape. Upon thawing, the casein of the milk was found to have been irreversibly coagulated. The milk also had developed a slight rancid flavor.

The existence of only slight rancidity, after two years, was thought to be promising. The author, on behalf of Herlihy Bros. Milk Co., continued the experiment in cooperation with Major Myron S. Arlein, Army Veterinary Corps. Attention was directed to the use of homogenized milk.

When it left Boston in 1944, the hospital ship "Chateau Thierry" carried frozen milk for the casualties on the return trip. Everyone was enthusiastic about it.

Following this test, Herilhy Bros, recently shipped 10,000 paper pints of frozen milk for use on hospital and troop ships.

As processed by this company, Grade A raw milk is pasteurized at 144 deg. F., held 33 minutes and then homogenized at 3,500 lb. After cooling, the milk is bottled in paper pints, which are packed in cardboard cartons, 20 to a carton. The milk is placed in a sharp freezer for 48 hours before being taken out for shipment.

It is probably advisable, for the prevention of cappy flavor, to pasteurize at a higher temperature and to eliminate all traces of copper in the equipment. No special equipment or processing is necessary.

The packages stand the expansion well, even when filled with a full pint. Keeping quality is set at a minimum of 60 days, but it is probably much longer. The care usual for any frozen food is required, but no more.

There probably is a considerable postwar market for this product. It can go wherever refrigerated transport is available. For instance, all ocean liners can carry milk in this form. In the meantime, the battle casualty, on hospital or troop ship, can smack his lips over a glass of "fresh" milk.

Army Wants Quantity, Quality in Dehydrated Foods

Requirements high for most fruits and vegetables with definite increase for white potatoes. Colonel Dunn tells how to improve quality through better plant practices. Control of bacteria important

THE armed forces will require a large quantity of dehydrated vegetables this year, regardless of whether the war in Europe ends, Lt. Col. Cecil G. Dunn stated in an address delivered at the annual meeting of the National Dehydrators Association, in Chicago, Feb. 6.

Estimates of the needs for Army and Navy, for the period from July 1, 1945, to June 30, 1946, show about the same totals for most items and a definite increase for white potatoes.

While these estimates are of great interest and value to the industry in making preliminary plans, it was emphasized by Col. Dunn that dehydrators should not solicit contracts at this time.

It may be expected that the Quartermaster Corps will consider the adoption of even lower maximum allowable moisture contents. The government will not ask the impossible, nor does it want to have the dehydrator produce heat injury in attempting to eliminate moisture, but it is as much to the advantage of the industry as to the government to achieve a low moisture content, since that should mean improved quality.

The sulphiting program, instituted in 1943, has progressed well. Sulphiting aids in preventing deteriorative changes during dehydration, and this, in turn, adds to the storage life of the products. Greater uniformity of color and better appearance result, with a greater factor of safety in drying.

At the present time all cabbage and carrots, a substantial quantity of white potatoes and some sweet potatoes are sulphited prior to dehydration. Sulphiting of white and sweet potatoes is not mandatory now, but it is expected that sulphiting of all white potatoes will become expedient. Dehydrators should become familiar with the technics and methods employed.

In order to obtain the best results possible, arbitrary ranges of sulphite concentrations have been established. These are: for cabbage, 750 to 1,500 parts per million in the dehydrated product; for carrots, 500 to 1,000 parts per million; and for white and sweet potatoes, 200 to 500 parts per million. If the concentration falls below the minimum end of the range, some of the benefits of sulphiting will be lost. Too much will ruin any product and is cause for rejection.

Recent Quartermaster Corps research carried out at the University of Maine has revealed that the use of fresh potatoes containing in excess of 0.5 percent of reducing sugars may lead to scorching during dehydration and to reduced storage life. Those containing less than 0.5 percent of reducing sugars are not usually subject to scorching. Potatoes differ in their reducing sugar content, depending on the variety, the conditions under which grown (soil, climate, locality) and the subsequent storage conditions. They differ also in the rate of disappearance of these sugars during warm storage. This entire subject is of primary concern to all dehydrators of white potatoes.

Reducing Rejections

Darkening, scorching, positive peroxidase reaction, high moisture and excessive defects are the more common causes of rejection, to which may be added the presence of wood slivers.

For white potatoes darkening has been controlled by use of preheaters, heat methods of peeling, the generous use of water on trim tables and to some extent by sulphiting. Scorching has been alleviated by use of potatoes low in reducing sugars, the content being brought down in many cases by storage in a warm warehouse for several days before use. Careful control of drying conditions and the use of sulphites also aid.

Rejection for active enzymes is

(*Turn to page* 180)

Estimated Requirements of Armed Forces and WFA for Dehydrated Vegetables and Fruits for Fiscal Year Starting July 1, 1945*

	WFA	Army	Navy	Total
	Thousand pounds (000 omitted)			
Potatoes, white				
diced or Julienne styles	30,000	100,000	24,000	154,000
precooked, shredded	....	10,046	....	10,046
Potatoes, sweet	....	15,792	3,600	19,392
Onions	10,182	10,968	1,750	22,900
Cabbage	5,273	7,104	1,600	13,977
Carrots	6,769	5,096	1,400	13,265
Beets	2,765	4,946	....	7,711
Rutabagas	1,825	....	600	2,425
Apple nuggets	....	8,820	1,600	10,420
Cranberries	....	1,188	600	1,788
Garlic powder	2,000	....	....	2,000
Tomato flakes	4,000	....	....	4,000

*These figures are the best estimates of requirements available at this time, but are not to be used as the basis of contracts.

America's Agar Industry

PART III—Agar may be used to advantage in some bakery and dairy products and in candy, jelly, canned foods and other items. It is used to give bulk and as a suspending, stabilizing, thickening or gelling agent

By C. K. TSENG, Scripps Institution of Oceanography, La Jolla, Calif.

THE value of agar lies in its strongly hydrophilic colloid and high gel-strength qualities. It is used where bulk is wanted, or where a suspending, stabilizing, thickening or gelling agent is desired. The author (Tseng, 1944) has estimated the annual consumption of agar in the U. S. in normal times, and the figures, broken down by type of use, are given in Table I.

Although the Chinese and Japanese have used agar as a food in a variety of ways, its chief use in America is as a food adjunct. In the early days when agar was first introduced here, it was erroneously thought to be highly nutritious food. In fact, according to Saiki (1906), some agar manufacturers claimed that "Its food value is more than double that of an equal weight of eggs or beef-steak." However, researches made by Saiki (1906) and others, showed agar to be imperfectly assimilated by the human body and, consequently, not nutritious. This is due to the absence, in the gastro-intestinal tract, of enzymes capable of breaking down the extremely complicated polysaccharide found in agar. Recently, Nilson and Schaller (1941), experimenting with the growth of male albino rats bred on agar, concluded that the apparent digestibility coefficient of the nitrogen-free extract of agar was about 28 percent, but that they grew very well on a partial agar diet. The good effect of such diet is due probably to the supply of bulk, rather that the actual nutritive value contributed by the agar.

Roughage

Since agar is a nonnutritive food, its incorporation into various kinds of breakfast and "health" foods, as well as in bakery products, merely supplies bulk for a wholesome diet. This problem of bulk supply is one that only civilized men, accustomed to highly refined food, have to consider. And it is for this purpose that agar has its most logical and valuable place in the human diet.

Agar plate, illustrating use of this seaweed product in bacteriological culture. In this case, trilaurin and an indicator, neutral red, were added to agar, and certain anaerobic bacteria grown on it. The darkening was due to the action of the liberated lauric acid on the indicator.

Table I—Annual Agar Utilization
(Estimated)

	Pounds
For laxatives	100,000
Microbiological and culture media	100,000
Bakery industry	100,000
Confectionery industry	100,000
Dental impression molds	75,000
Meat packing	50,000
Emulsifiers	50,000
Cosmetics	25,000
Miscellaneous uses	50,000
Total	650,000

Bakery Products

The use of agar in bakery products also serves to increase bulk. There are so-called low-calorie breads or biscuits specially made for obese patients in need of reducing, and yet who must satisfy their desire to eat enough food. A patent was granted to Keyser (1916) for making crackers, wafers, cookies and other forms of biscuits containing agar, for people troubled with constipation. Keyser mixed agar in a "dry" dough, and after baking, the finished product contained ungelatinized agar. For the same purpose, a special "Agar and Oil Wafer" was made by a Cincinnati, Ohio, company. These were chocolate wafers, each containing a teaspoonful of mineral oil and agar, and were recommended to be taken with meals. The oil and agar, released during digestion, mix with waste materials in the lower intestine, and provide an aid to elimination. An analysis on "Agar-Bran Biscuits" was made by Bailey (1929) who found they were relatively low in protein and that their carbohydrate was very largely unassimilable. Because of its excellent moisture-retaining ability, agar also is added to some types of bread and pastries to keep them from drying out too readily. There also are special breads for diabetics in which the starch is removed and replaced by agar.

Dairy Products

In the manufacture of frozen dairy products, such as sherbets and water ices, agar is used as a stabilizer. It makes these products smooth and holds down the overrun by preventing the drainage of unfrozen sirup from the product in the hardening room. Unlike gelatine, agar acts quickly, and aging of the product is unnecessary. However, it has low whipping ability, so gums, which are better in that respect, must be added. Dalberg (1926) recommended 0.2 percent agar, together with 0.4 percent gum tragacanth or high-grade India gum for ices, and with 0.2 percent for sherbets. The high cost of agar in recent years, however, has prevented its wider and more general use in this field. Because of its low overrun and poor whipping qualities, agar is not recommended as a stabilizer in making ice cream.

In the manufacture of cream cheese of the Neufchatel type, agar serves to reduce the tendency of the cheese to exude when at warm temperatures, to provide slicing qualities and to produce a firmer body (Dalberg, 1927). While its use has

the disadvantage of requiring a higher temperature to dissolve it than if gelatine is used, agar has a decided advantage over the latter in improving the texture of the cream used in the cheese (Marquardt, 1930). Powdered agar of the highest grade is recommended for cheese, and the quantity used in this product varies from 0.2 to 0.1 percent.

As a stabilizer and thickener, agar also is used in such drinks as malted milk and acidophilus milk. A patent was granted Lecomte (1911) covering the use of agar to prevent the separation of fat in cream or milk. In preparing the so-called "Imperishable Milk," North (1924b) separated the solids from the cream, which was then emulsified with agar. his process took away the "foods" for the growth of putrefying bacteria, thus helping to keep milk fresh. On the same principle North (1924a) was granted another patent on "imperishable butter." For these purposes 0.5 percent agar was used.

Jelly, Candy and Other Food Preparations

At the time agar was introduced to America and European countries, during the middle part of the last century, it was originally intended to serve as a gelatine substitute in making fruit and vegetable jellies. Having a much higher strength, about eight times or more than that of ordinary gelatine, it is a more economical gelling agent. Unlike gelatine, it does not require refrigeration to form a firm jelly, even in tropical countries, and it requires less time to make an agar-based jelly. Orthodox Jews prefer jellies made of agar to those made of gelatine, which is of animal origin. And compared with pectin, agar has the advantage of not requiring sugar to make jelly.

In the manufacture of confections, agar is used in making jelly candies and marshmallows. Jelly, for this purpose, is made by adding as little as ¾ to 1 percent to the mix. It also tends to make the final product easier to cut.

Agar is used extensively in making icings and various types of custard-like preparations and has been used in mayonnaise (Hart, 1937) although legally such a product should not longer be so called. It is also used in preparing various kinds of salad dressing and it is reported to be used as a sausage casing. A patent using agar, al-

(*Turn to page* 178)

Electronic Method For Moisture Tests

Flour and other food materials dried by new device permit quick free-moisture determination without affecting food components

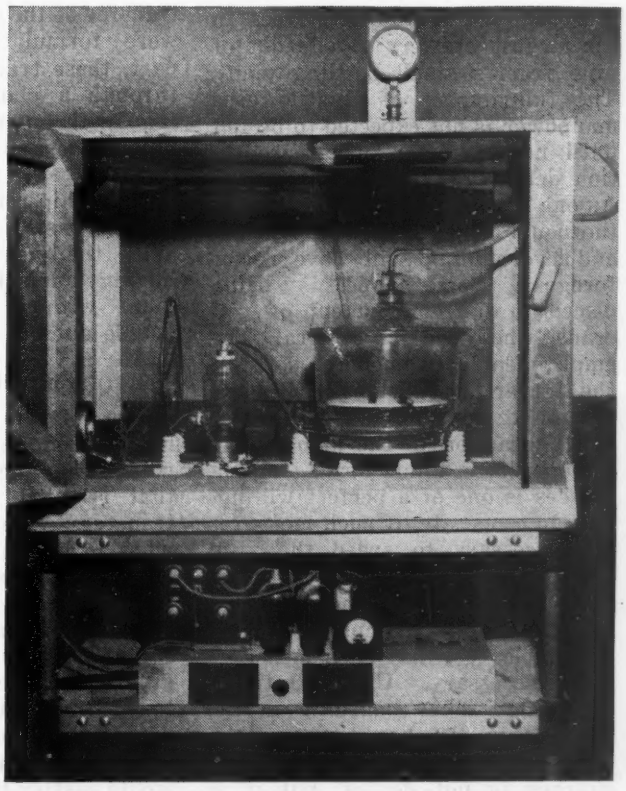
MOISTURE determination in many foods is difficult, because drying the food to remove the "free" moisture also damages the foodstuff. To avoid this difficulty, a new method using electronic heating (the dielectric type) has been developed for flour testing. This method was devised by Alfred Christie at the Beltsville laboratories of the Bureau of Plant Industry, in a project done for the War Food Administration.

Operated somewhat like a radio unit with high-frequency current (about 112 megacycles), the new apparatus produces heat inside the flour sample. The material is held between the two plates of a "capacitor," and the rapidly alternating electro static field sets up molecular stresses which generate heat in the product.

A sample of about a gram of flour is accurately weighed in a fused quartz crucible. Placed in the apparatus, the moisture is driven off by the heat generated inside the sample itself. During electronic heating, the material may be kept in a vacuum to speed evaporation and elimination of the moisture from the surrounding atmosphere. In the original test method, a closed vacuum desiccator is used. As the moisture evaporates, the sample cools off and the flour or other cereal is not damaged. Thus the free moisture is eliminated in about 30 to 35 minutes without removing any of the water of constitution. The sample can be weighed immediately after the test, the loss of weight indicating the moisture content.

A patent (U. S. Pat. 2,360,108) has been obtained by the inventor and assigned to the Secretary of Agriculture. The apparatus has not been commercially developed as yet, but it is proposed that licenses for its development be granted on a nonexclusive basis to responsible applicants. The experimental laboratory method is shown in the accompanying photograph.

Preliminary tests indicate that this apparatus can be used on a wide variety of other materials which otherwise are difficult to dry for moisture determination.



Experimental model of high-frequency desiccator used in moisture determinations.

New High in Labor Problems

If your food plant is not on the local urgency list, you may have to give up some of your workers to war plants. The precedent has been set

By J. A. J. JONES, Assistant Editor, "Food Industries"

WHEN the War Manpower Commission takes employees out of your plant to make them available to more critical war plants, you will have experienced about the worst that personnel problems have to offer. Such an experience is not just a remote possibility, for it has already happened to the brewers and bottlers in the Allentown, Pa., area and it is being given serious consideration in many other labor-tight areas.

The so-called "war work or no work" plan that was put into operation during the past two months by the Allentown area heads of the WMC took 97 workers from the breweries and bottling works of the section and, through the United States Employment Service, transferred them to war industries.

How It Works

The numbers released ranged from 22 out of 150 employees in the largest brewery to one out of nine from a small bottling plant. The full impact of this lowered manpower is not expected to be felt until next summer, when production demands will be at the peak. As one brewery official pointed out, the usual off-peak jobs of painting and overhauling will have to be foregone. Some hope is being placed in the employment of veterans, who need no referral. The employment of women for some of the lighter jobs, such as bottling, is also being considered.

The reaction to the plan among the operators, union heads and employees is one of a perfect willingness to cooperate, if such measures are necessary to speed the vital war products to their destinations. But there is an undertone of serious doubt, particularly among the employees, that such measures are necessary. Unsubstantiated charges of labor hoarding in the war plants are heard frequently. That there is some basis for these charges is not denied, but it is claimed that most such cases are simply a necessary part of the war effort. A brand new plant in a brand new industry is bound to develop lags in the production line during the early periods of operation. Similarly, experience has indicated that a certain amount of employee "insurance" is a necessity in plants where new and unexpected Army and Navy rush orders are constantly arising.

Allentown has been one of the tightest manpower areas since the beginning of the war. Employment ceilings were established last July throughout the area which includes Bethlehem, with its great steel plant. This new plan represents simply a cutback from those established ceilings. After making an industry-wide employment inventory, WMC officials called the operators and heads of the labor unions effected, for conference. The manpower needs in the vital war plants were explained and the new ceilings discussed. Plans for the transfer of the overquota employees were formulated. For the most part, these transfers were effected through a plant committee working with management and the union. The seniority rights of the men are to be protected and union membership retained on a non-dues paying basis. This provision enables the men to join the union having jurisdiction in the war plant without the imposition of double dues.

Reduction in Pay

One of the biggest stumbling blocks from the employees' standpoint was the reduction in pay that resulted from many of the transfers. Where the less essential plant had been operating on a 40-hour week, this drop from a semi-skilled to an unskilled rate was not so great, as the overtime pay for 48 hours made up most of the difference. There was little relief to be offered those who had been on a 48-hour basis except the hope that they might develop skills that would justify their rise to a higher rate. The men were referred to plants where it seemed their experience would best fit them, and an effort was made to allow them a choice. Constant refusal to accept one of the jobs offered, however, would result only in no job.

There is no set manpower pattern in use on a national scale. Each area director is authorized to establish the ceilings for the plants in his area. If a food plant is not on the local urgency list it is considered less essential and has to take its chance with other industries in that class. Any plant, however, may apply for an urgency rating, which, if granted, makes it an essential industry. The appeal should be made first to the area management-labor advisory committee. Beyond the area committee is the state committee, then the regional committee, and finally the national committee in Washington.

That the plan might bite even deeper into the food industry is illustrated by a recent statement of Phillip P. Gott, president of the National Confectioners Association, who points to the hardships of fulfilling government orders for candy bars if the planned 10 percent reduction in the Chicago area is carried out. In this area the candy plants are unclassified.

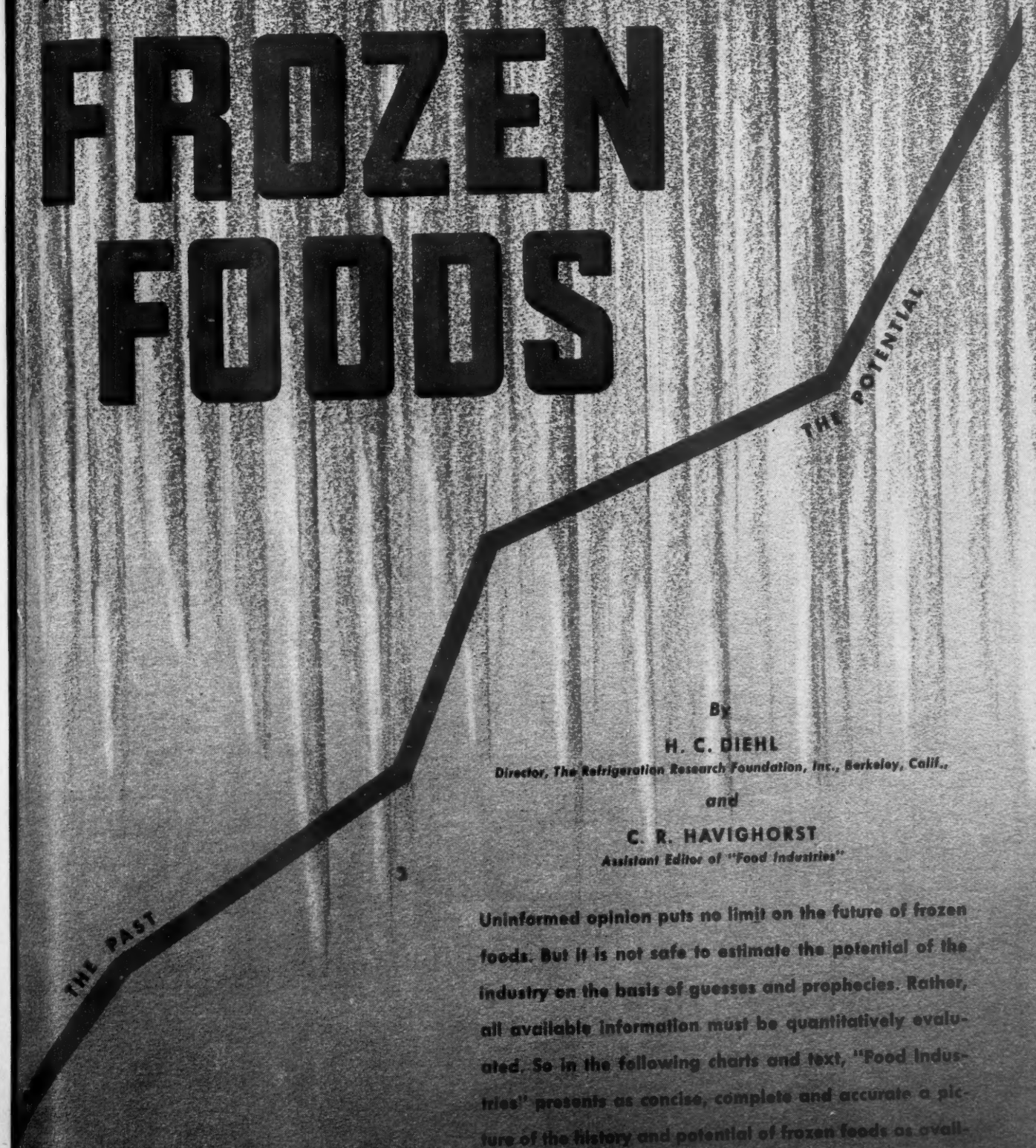
Cooperation Advisable

Whether or not the food manufacturers agree with the necessity for such a program, they have little choice but to go along in full cooperation. In the first place, they are not in a position to judge the labor situation in their area and consequently not competent to judge the value of the measures taken. Then too, charges of unpatriotism, no matter how unjust, are difficult to overcome. Finally, while most government officials are sincerely trying to do a competent job, there is occasionally the vindictive little fellow who might not hesitate to raise hob with what the reluctant operator has left of employee quotas, draft deferments, priorities and the like.

like. The wise operator will go along as best he can.

FOOD INDUSTRIES REPORTS ON

FROZEN FOODS



By

H. C. DIEHL

Director, The Refrigeration Research Foundation, Inc., Berkeley, Calif.,

and

C. R. HAVIGHORST

Assistant Editor of "Food Industries"

Uninformed opinion puts no limit on the future of frozen foods. But it is not safe to estimate the potential of the industry on the basis of guesses and prophecies. Rather, all available information must be quantitatively evaluated. So in the following charts and text, "Food Industries" presents as concise, complete and accurate a picture of the history and potential of frozen foods as available data will permit. Future problems are discussed.

MARCH, 1945

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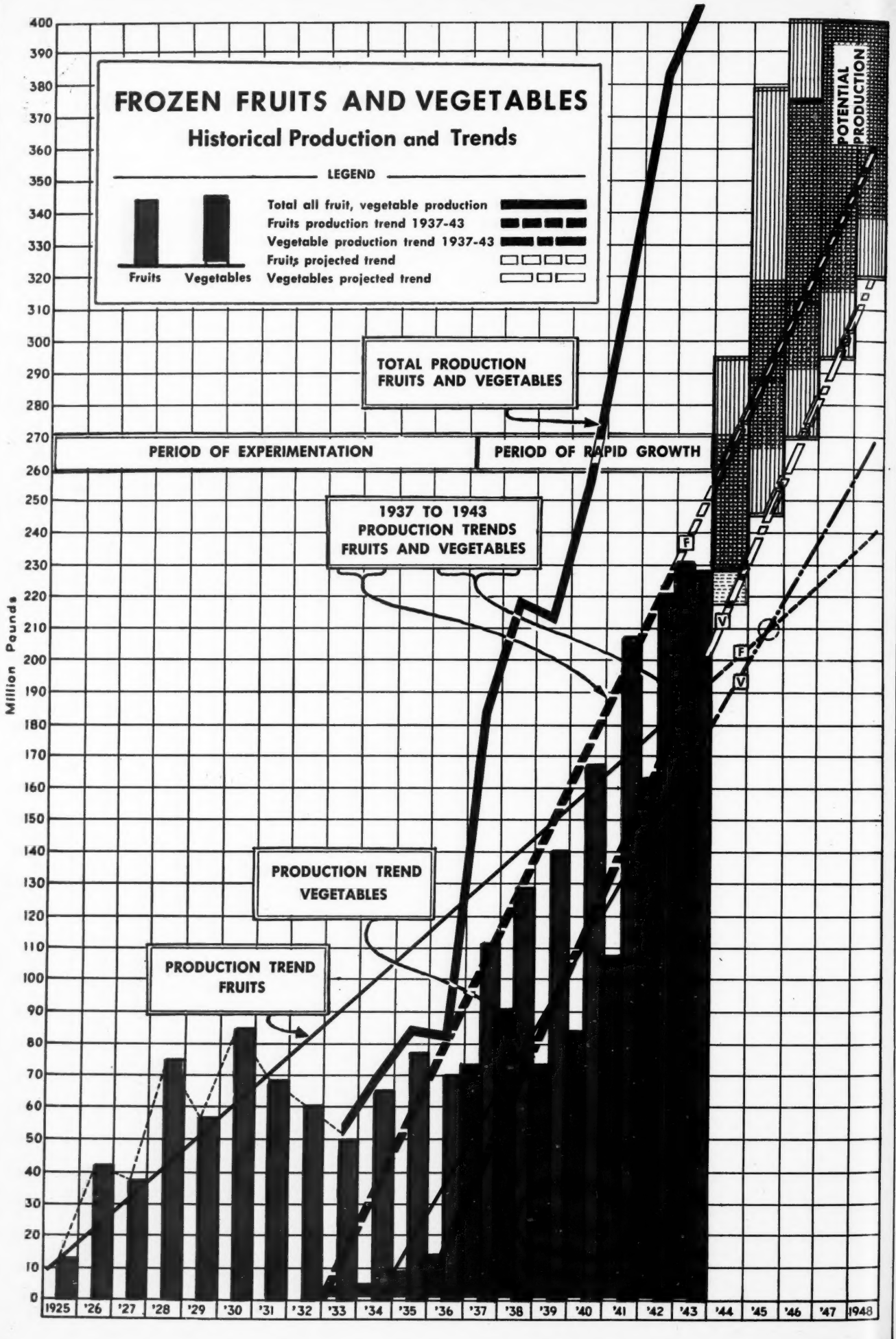
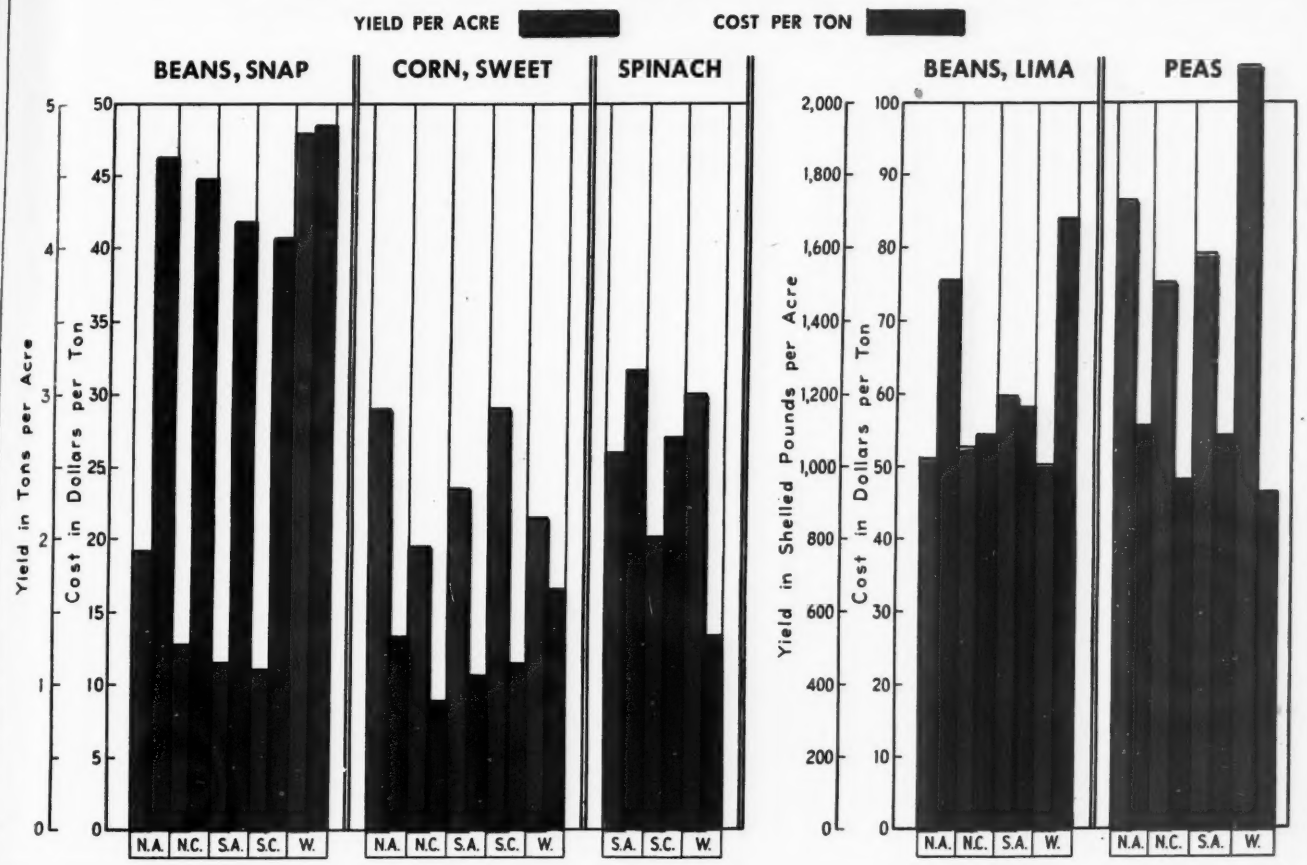

FROZEN FRUITS AND VEGETABLES
Historical Production and Trends
LEGEND
Fruits
Vegetables
Total all fruit, vegetable production
Fruits production trend 1937-43
Vegetable production trend 1937-43
Fruits projected trend
Vegetables projected trend
POTENTIAL PRODUCTION
TOTAL PRODUCTION FRUITS AND VEGETABLES
PERIOD OF EXPERIMENTATION
PERIOD OF RAPID GROWTH
1937 TO 1943 PRODUCTION TRENDS FRUITS AND VEGETABLES
PRODUCTION TREND VEGETABLES
PRODUCTION TREND FRUITS
Million Pounds
Yield in Tons per Acre
F
V
1925 '26 '27 '28 '29 '30 '31 '32 '33 '34 '35 '36 '37 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

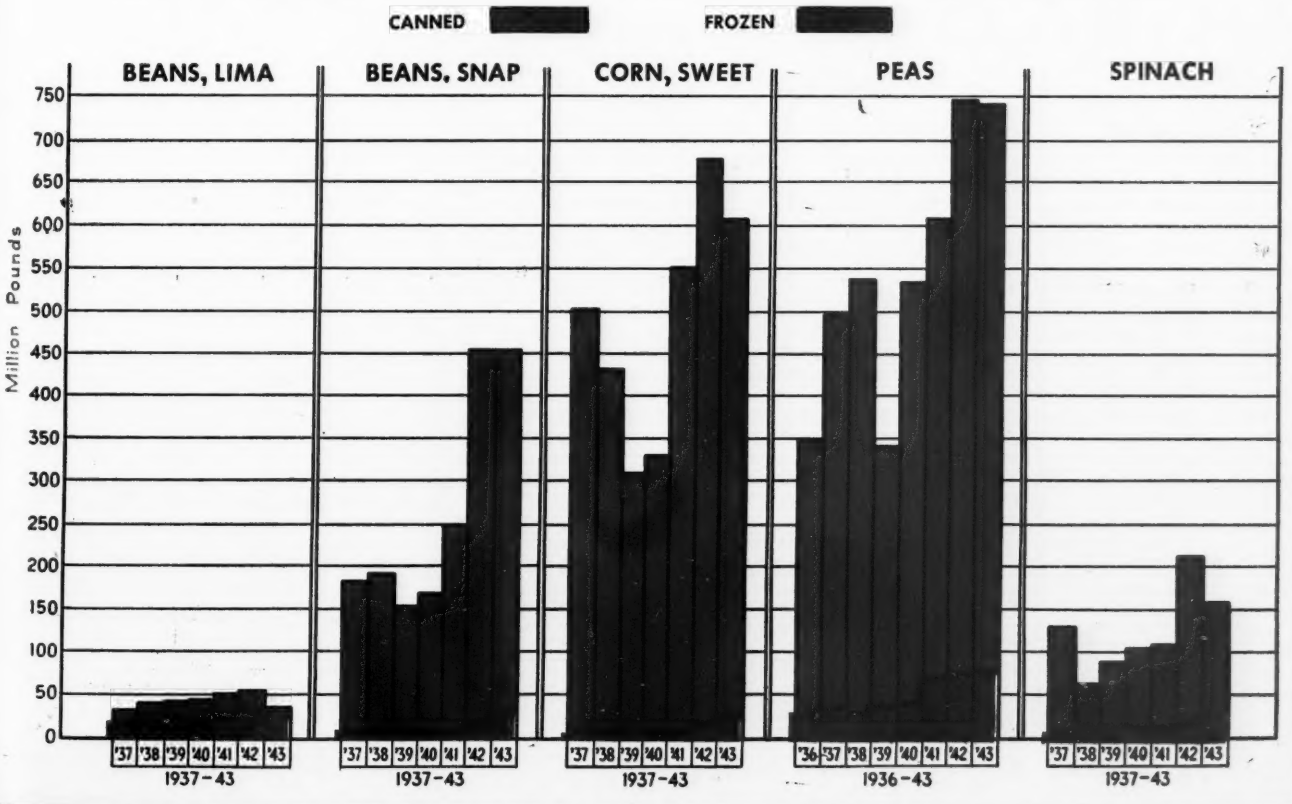
COMPARATIVE YIELD AND COST OF FIVE SELECTED VEGETABLES GROWN FOR PROCESSING IN FIVE REGIONS

1. N.A. — North Atlantic, 2. N.C. — North Central, 3. S.A. — South Atlantic, 4. S.C. — South Central, 5. W. — West



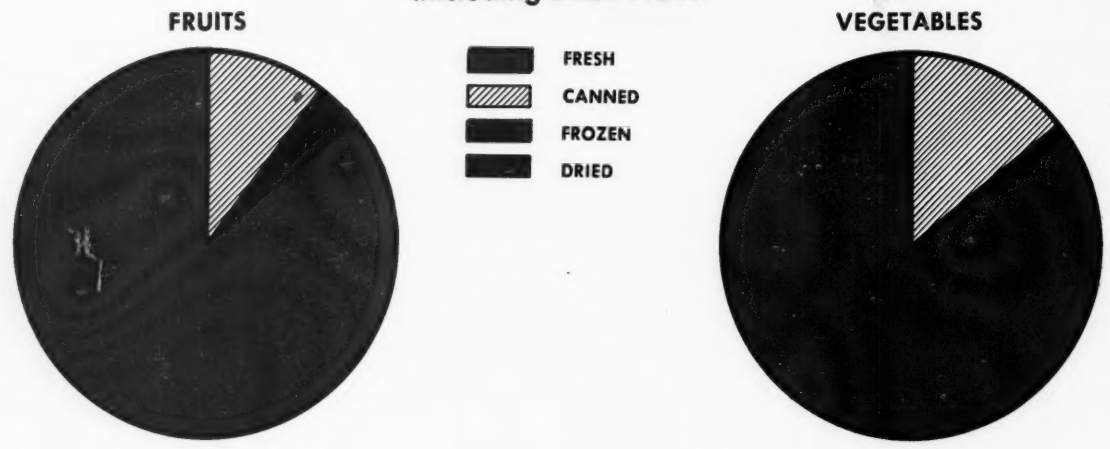
COMPARISON OF UTILIZATION OF FIVE SELECTED VEGETABLES

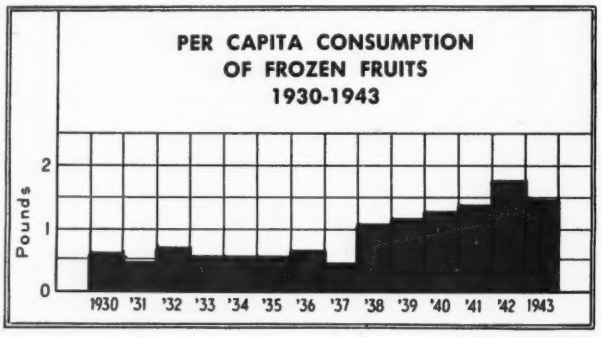
Canned vegetables reduced to "drained weight" to compare with utilization of same product frozen

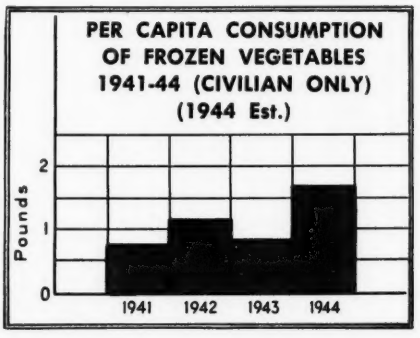


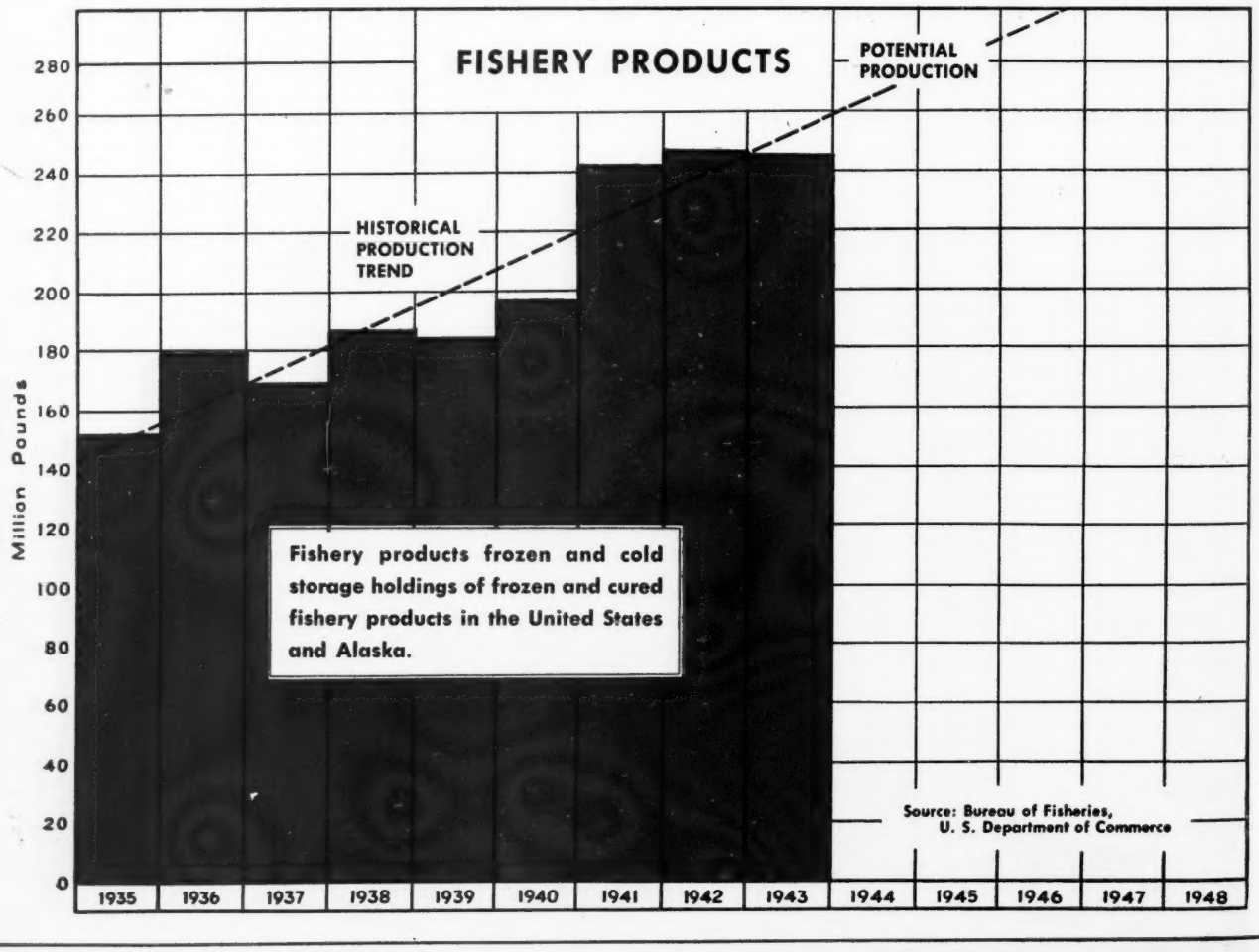
CIVILIAN CONSUMPTION OF FRESH, CANNED AND FROZEN VEGETABLES AND FRUITS

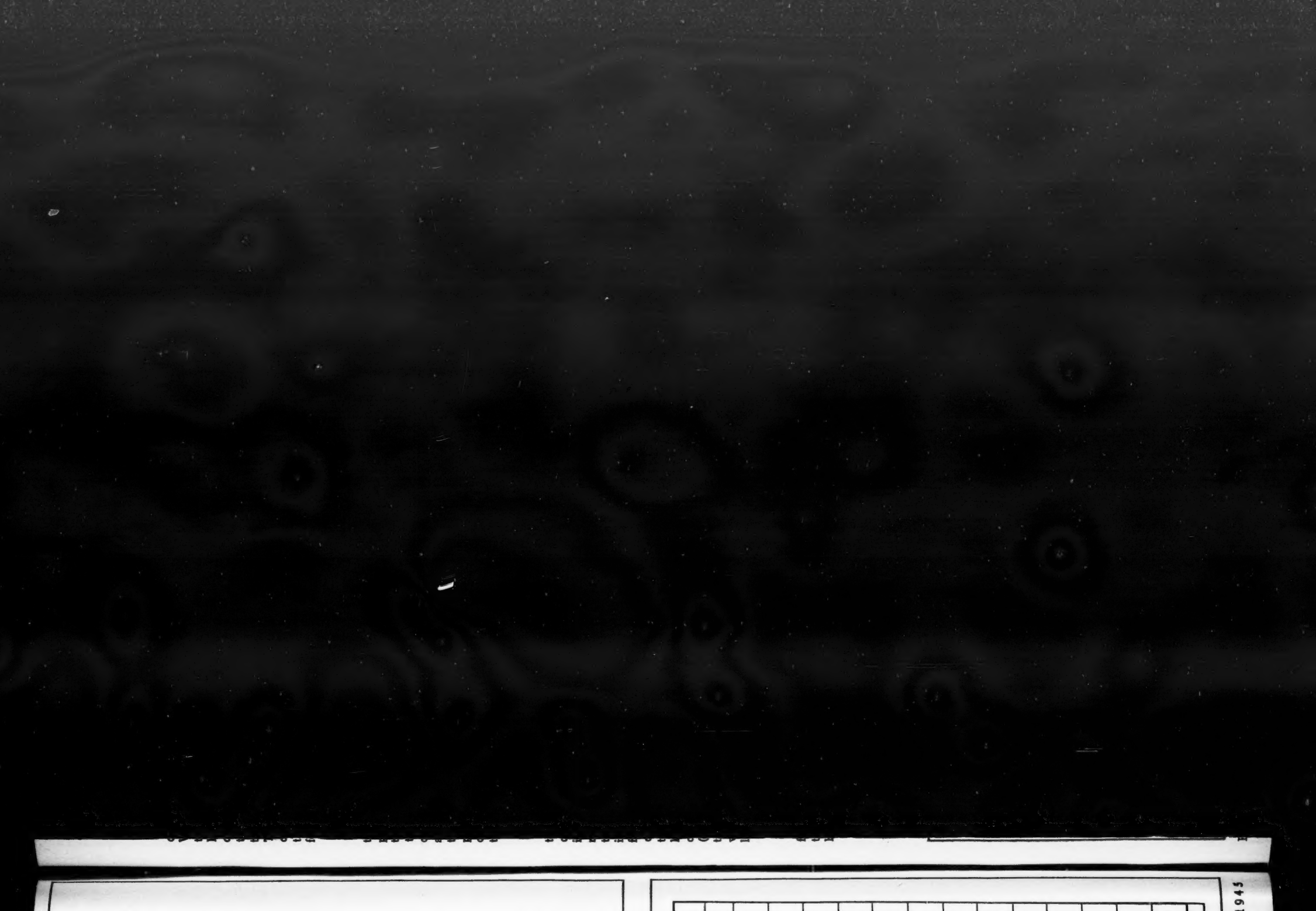
(Including Dried Fruits)











FROZEN VEGETABLES

These charts are all uniform in design. The red bars show annual Western production, and that of the East is represented by blue bars. Total U. S. production (East and West combined) is shown by the heavy curve, directly above the red and blue production bars. The broken line running diagonally across each chart represents the historical trend of production for the years 1937 to 1943.

●

Potential increase in the production of each product is shown by projecting the historical production trend line through the years 1944 to 1948. The possible future production of frozen products, represented by this line, depends upon the ability of the industry to expand, distribute and market an increased production of foods during these years.

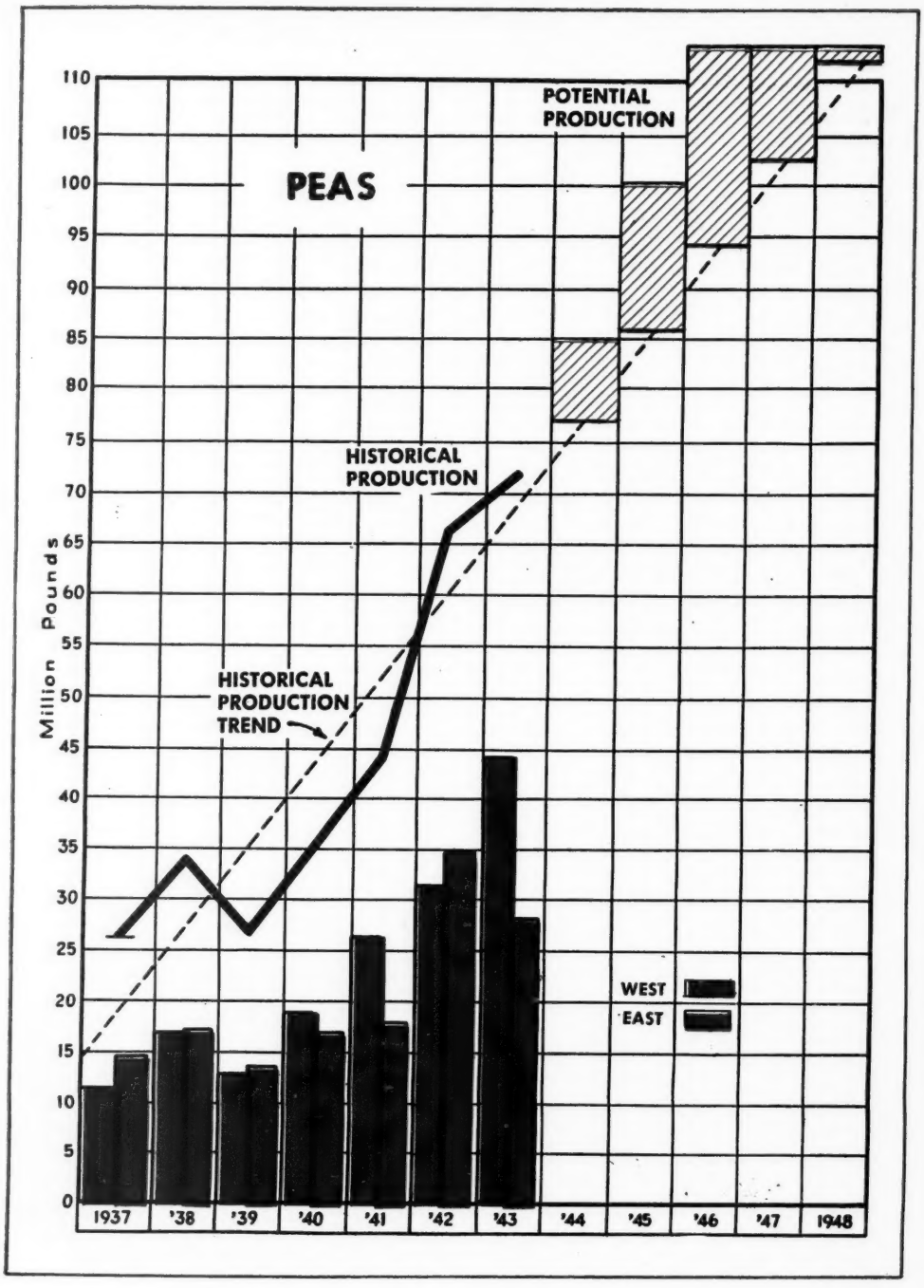
●

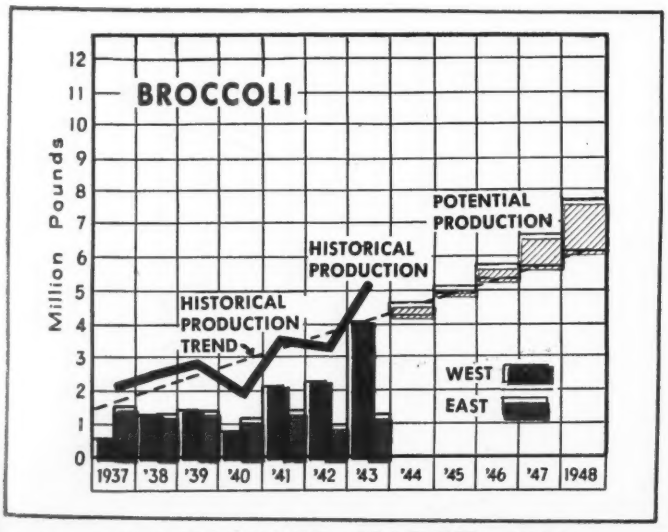
The scope of future production, that is, the maximum or minimum amount that may be produced, is indicated by the shaded areas surrounding the projected historical trend line in the years 1944 to 1948, inclusive. (Complete production figures for 1944 are not yet available.) The size and location of these shaded areas were obtained by adding the known average percentage of production increase (1937 to 1943, inclusive), cumulatively, to a base production figure, which is an average of at least the last three years of production.

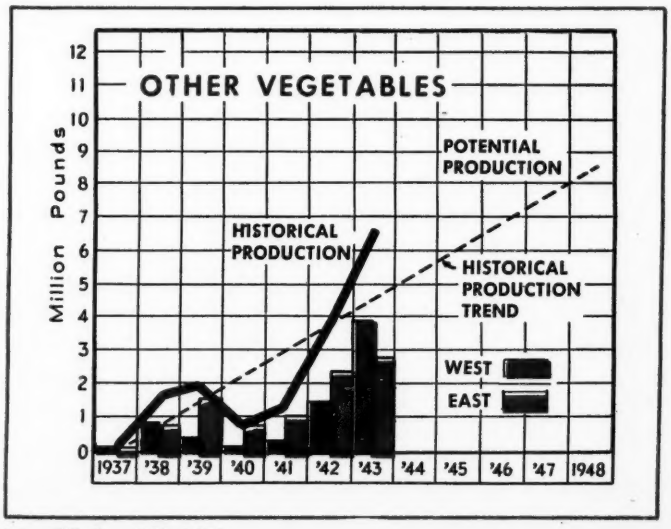
●

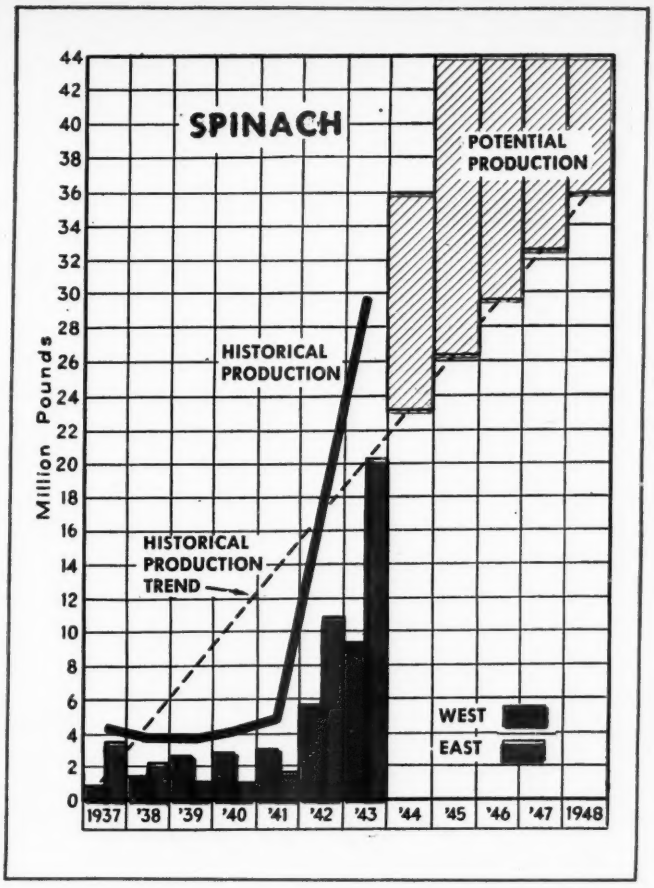
In instances where production figures could not be broken down to East-West regions, production bars show only total U. S. output.

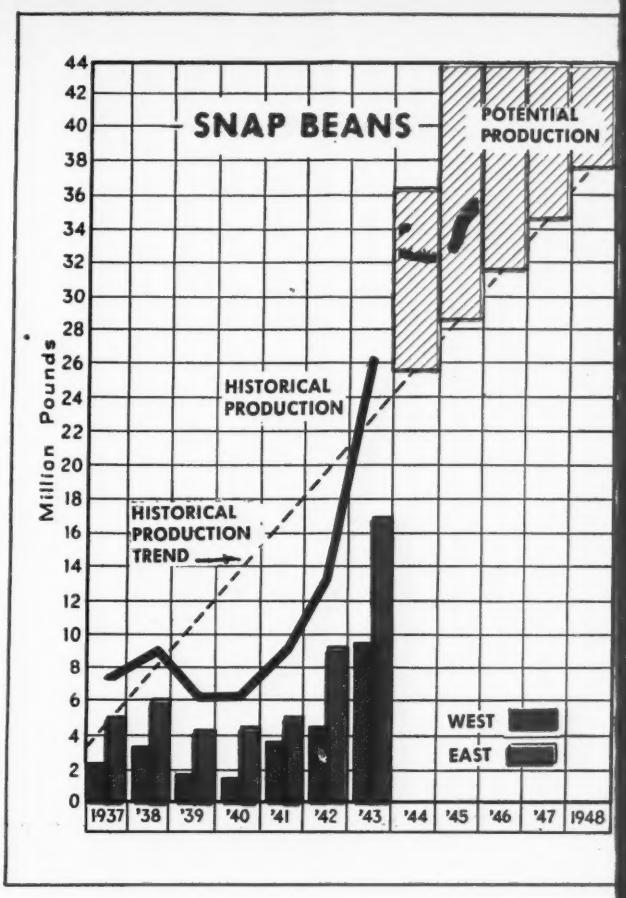
●

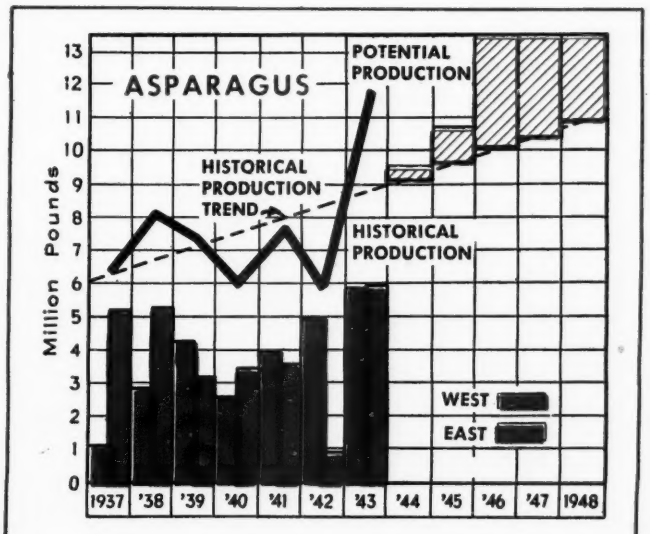







SPINACH
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
WEST
EAST
Million Pounds
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


SNAP BEANS
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
WEST
EAST
Million Pounds
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


ASPARAGUS
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
HISTORICAL PRODUCTION
WEST
EAST
Million Pounds
0 1 2 3 4 5 6 7 8 9 10 11 12 13
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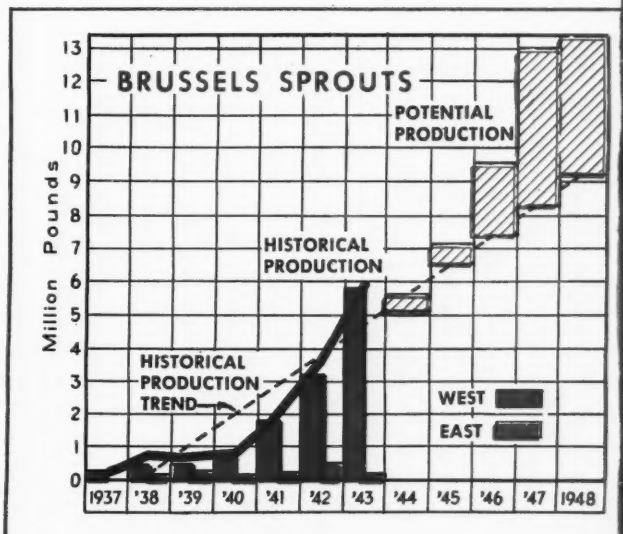
BRUSSELS SPROUTS
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
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EAST
Million Pounds
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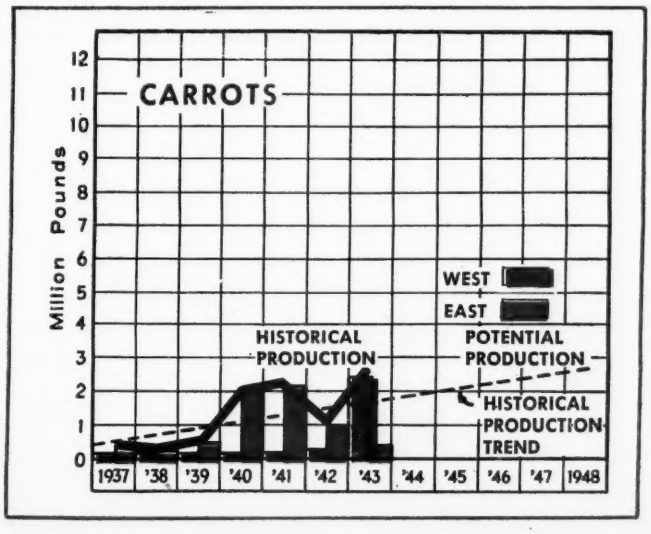
CARROTS
WEST
EAST
HISTORICAL PRODUCTION
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
Million Pounds
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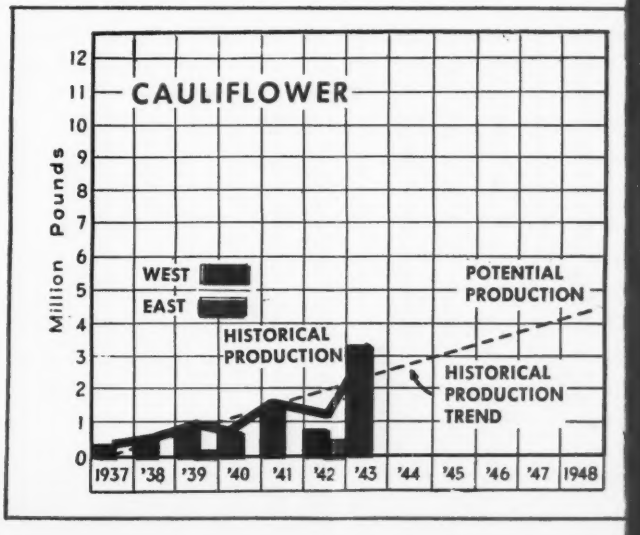
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


CAULIFLOWER
WEST
EAST
HISTORICAL PRODUCTION
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
Million Pounds
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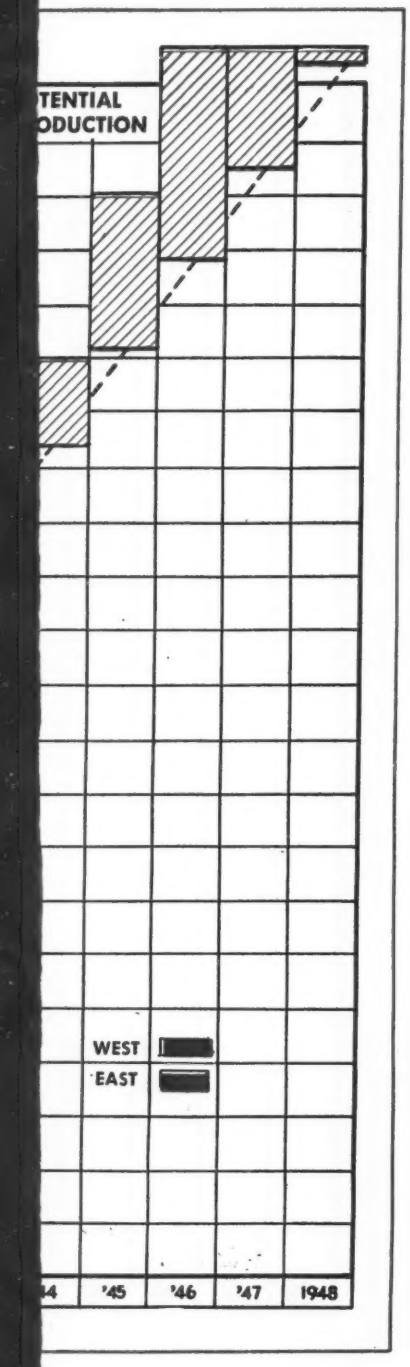
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


TENTIAL
ODUCTION
WEST
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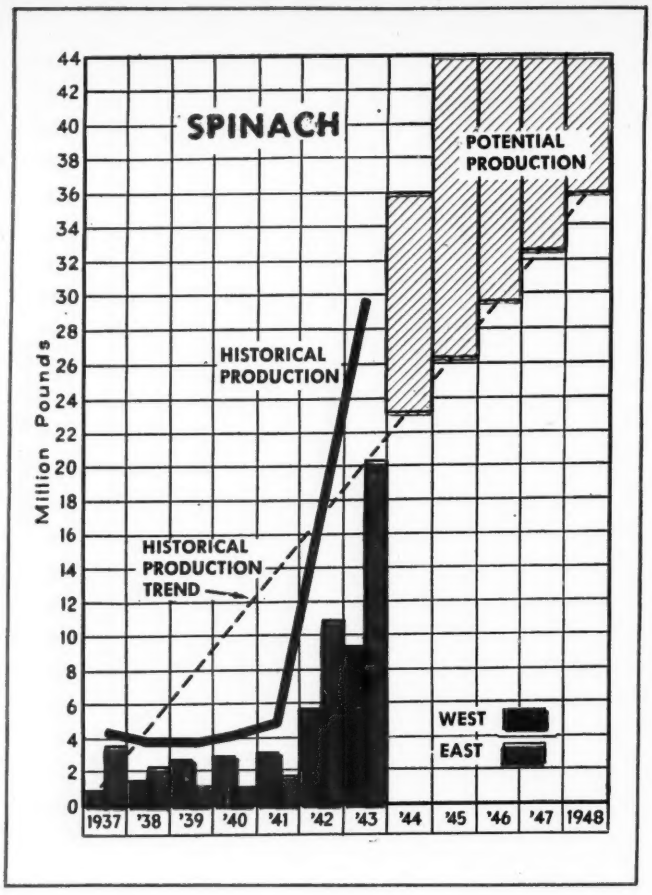
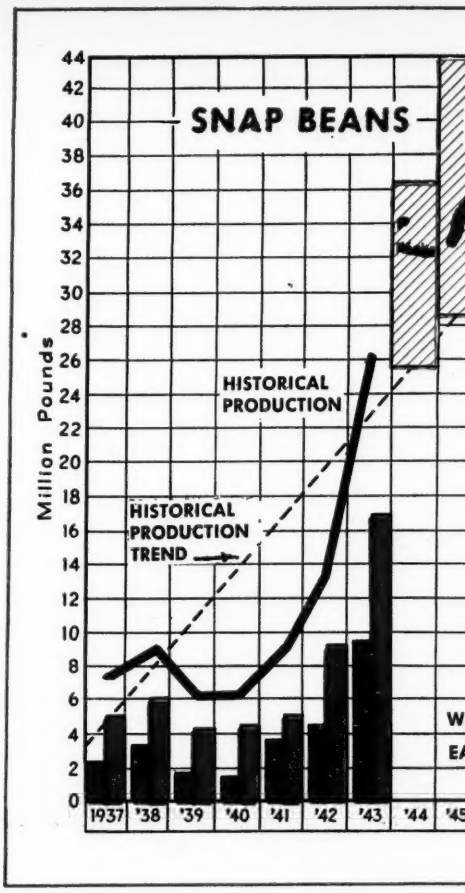
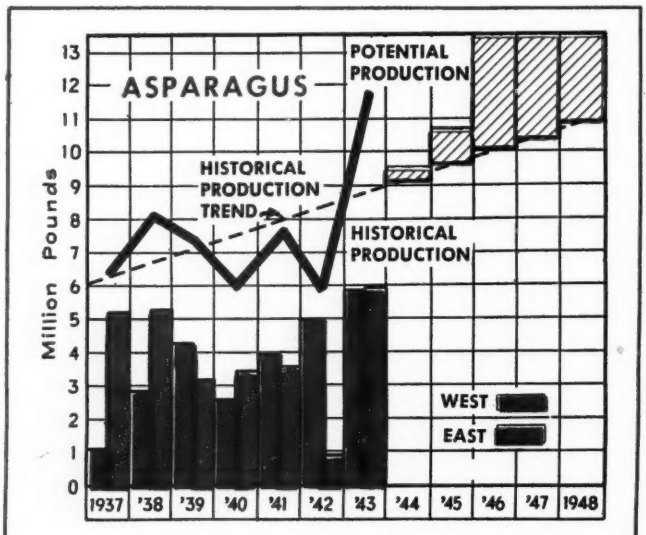
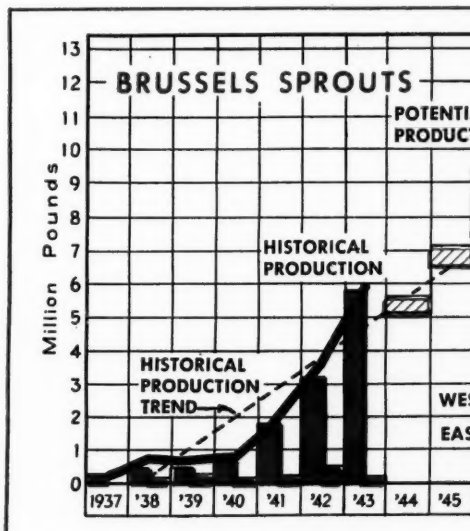
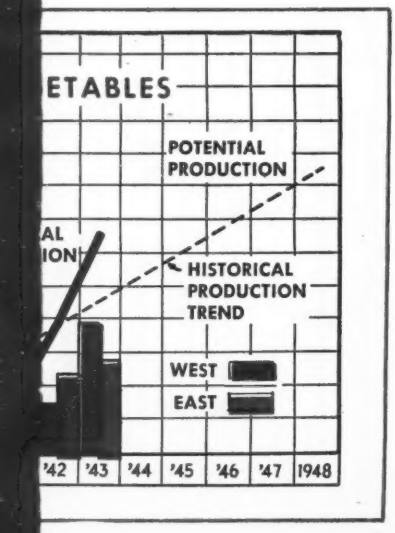
1948

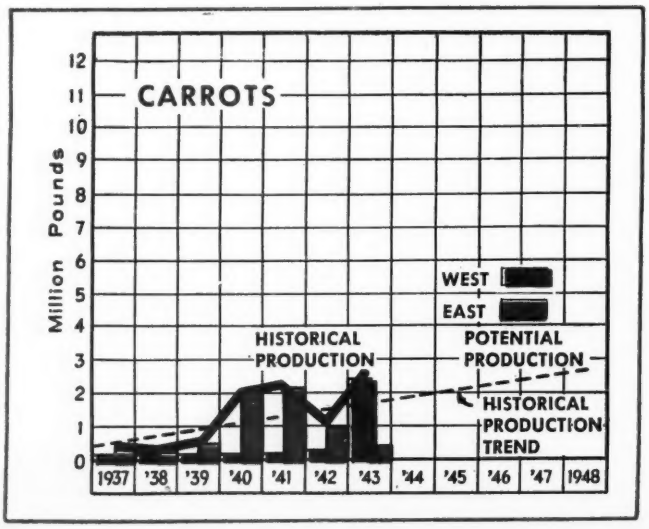

SPINACH
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
Million Pounds
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

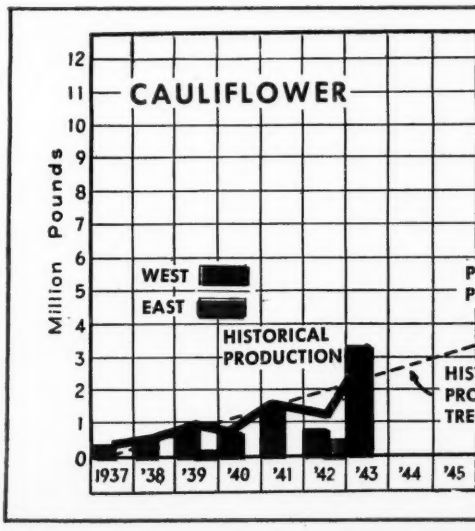

SNAP BEANS
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
Million Pounds
1937 '38 '39 '40 '41 '42 '43 '44

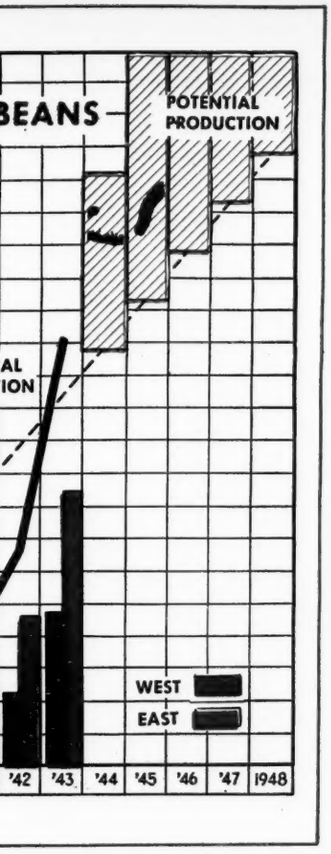

ASPARAGUS
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
HISTORICAL PRODUCTION
Million Pounds
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

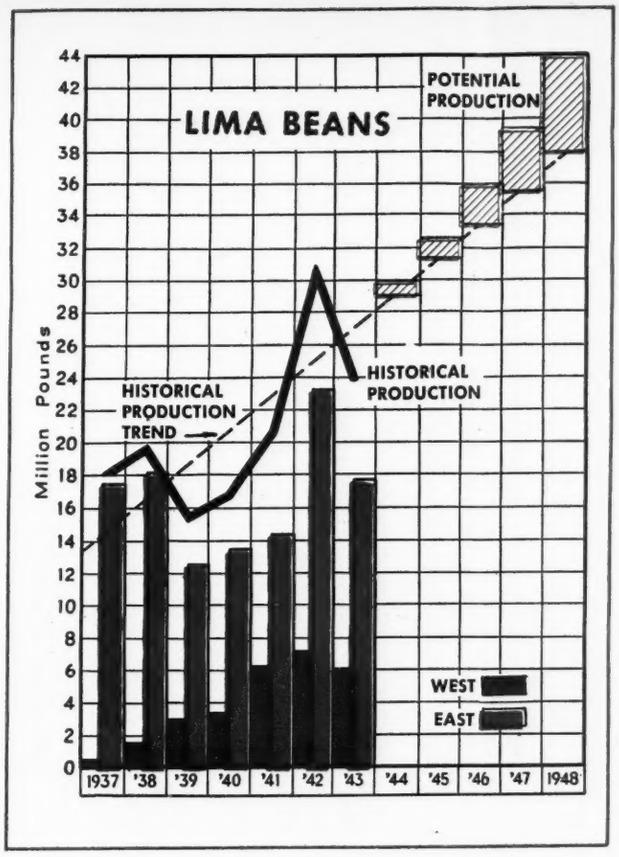

BRUSSELS SPROUTS
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
Million Pounds
1937 '38 '39 '40 '41 '42 '43 '44 '45

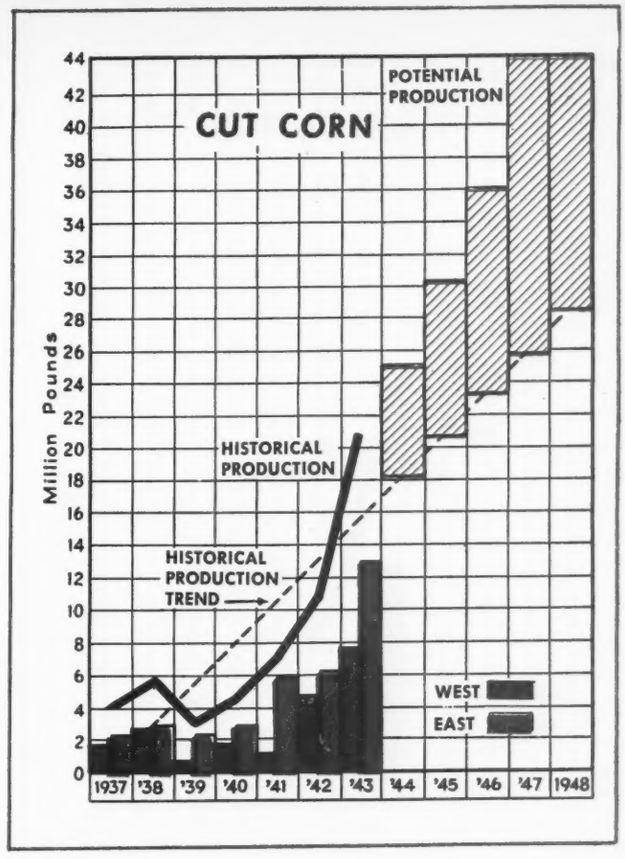

ETABLES
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
WEST
EAST
'42 '43 '44 '45 '46 '47 1948

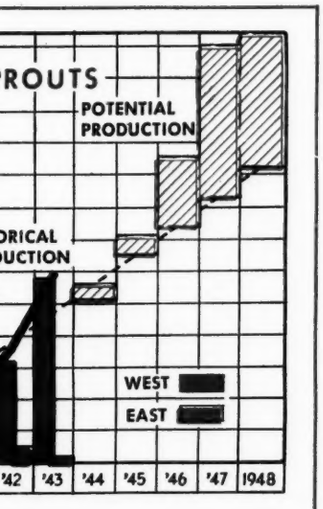

CARROTS
Million Pounds
WEST
EAST
HISTORICAL PRODUCTION
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

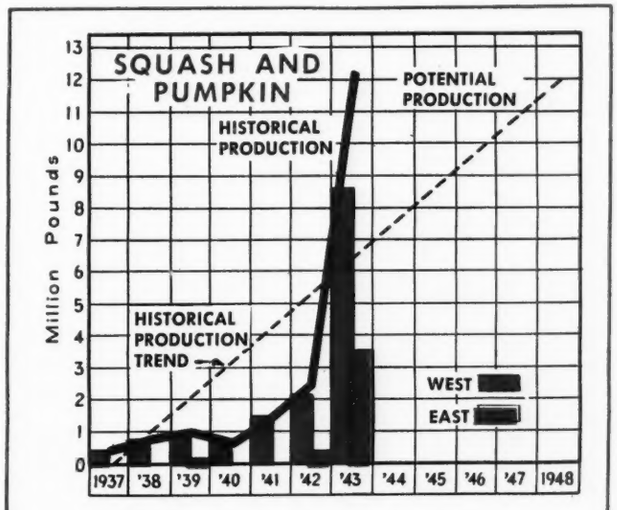

CAULIFLOWER
Million Pounds
WEST
EAST
HISTORICAL PRODUCTION
1937 '38 '39 '40 '41 '42 '43 '44 '45

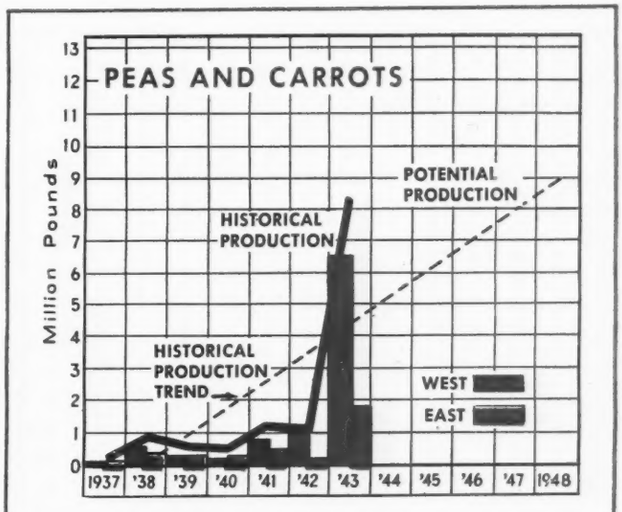

BEANS
POTENTIAL PRODUCTION
AL ION
WEST
EAST
'42 '43 '44 '45 '46 '47 1948

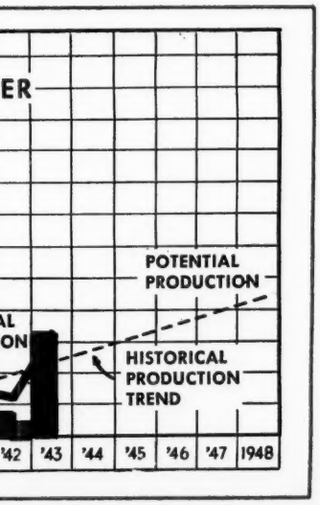

LIMA BEANS
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
HISTORICAL PRODUCTION
Million Pounds
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

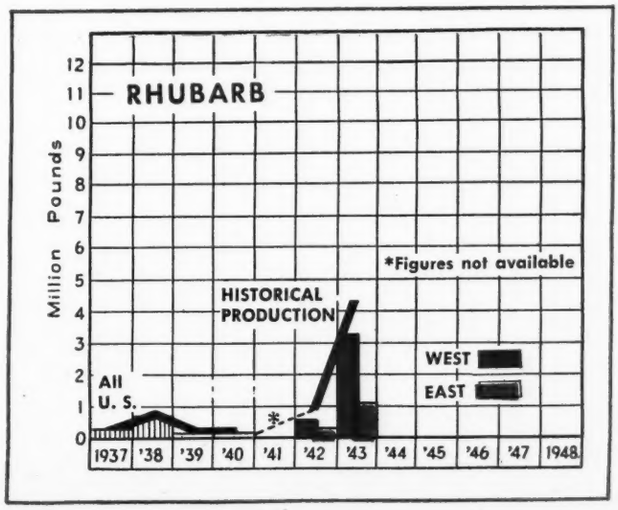

CUT CORN
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
Million Pounds
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

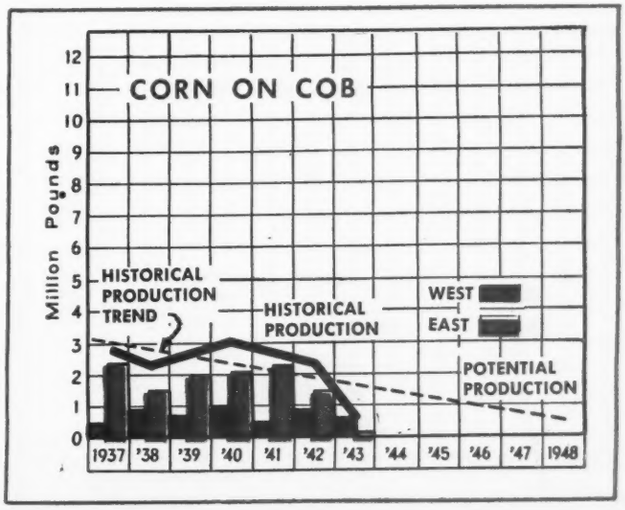

PROUTS
POTENTIAL PRODUCTION
ORICAL DUCTION
WEST
EAST
'42 '43 '44 '45 '46 '47 1948


SQUASH AND PUMPKIN
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
Million Pounds
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


PEAS AND CARROTS
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
Million Pounds
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


ER
POTENTIAL PRODUCTION
AL ON
HISTORICAL PRODUCTION TREND
'42 '43 '44 '45 '46 '47 1948


RHUBARB
*Figures not available
HISTORICAL PRODUCTION
All U. S.
Million Pounds
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


CORN ON COB
HISTORICAL PRODUCTION TREND
HISTORICAL PRODUCTION
POTENTIAL PRODUCTION
Million Pounds
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

FROZEN FRUITS

With the exception of the strawberry chart, these are all uniform in design. Red bars depict Western frozen fruit production. Blue bars represent Eastern production. The total U. S. production of each product is shown by the heavy curve directly above the East-West production bars.

●

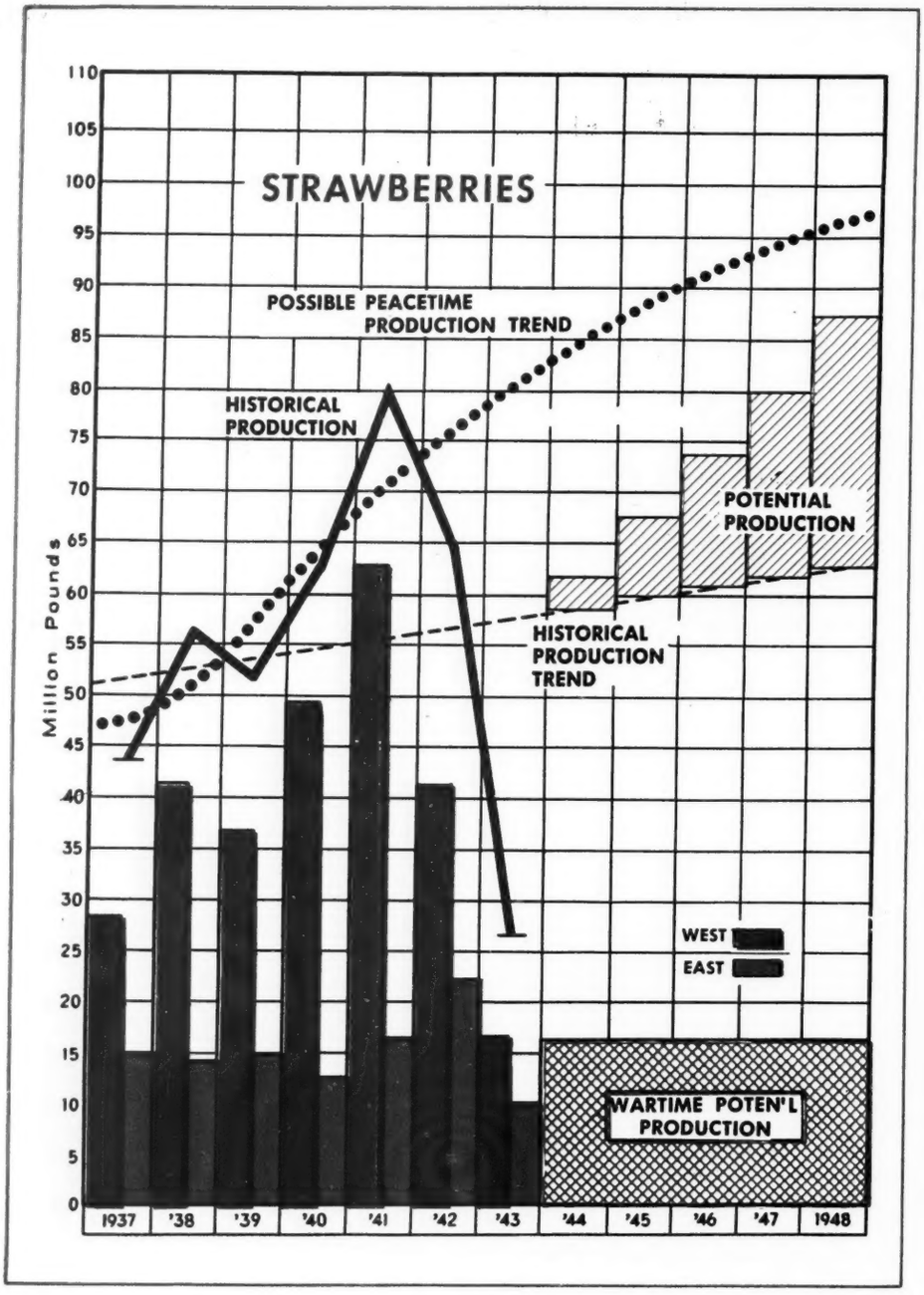
The broken line running diagonally across each chart represents the historical trend of production for the years 1937 to 1943, and the potential increase in production for 1944 to 1948 is shown by projecting this line through these years. As in the frozen vegetable production charts, the possible scope of future production—the maximum or minimum amount that may be produced — is indicated by shaded areas surrounding the projected historical trend line in the years 1944 to 1948, inclusive. (Complete production figures for 1944 are not yet available.)

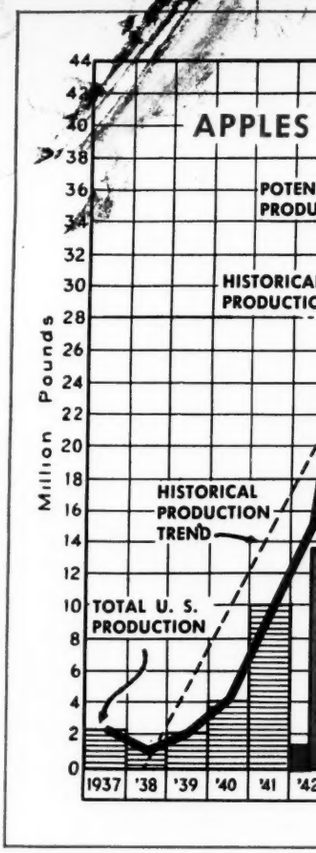
●

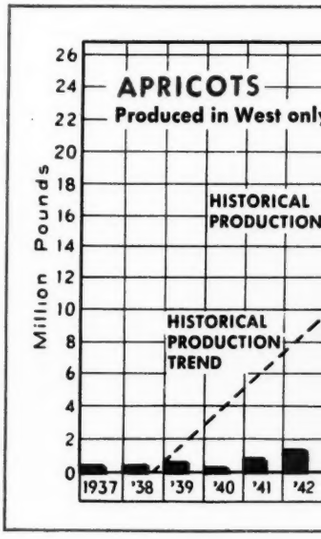
Contrary to the effect of wartime demand that is shown for other fruits, the production of frozen strawberries has declined sharply during the last two years shown on the chart. Although, for the present, this is a correct picture of the production of this berry, it undoubtedly is only a temporary situation. Because of the strong demand for this product in both institutional and consumer markets, production should increase rapidly shortly after the end of the war.

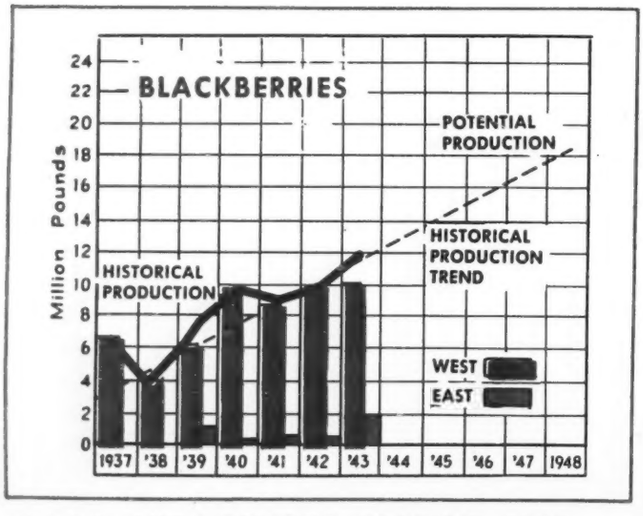
●

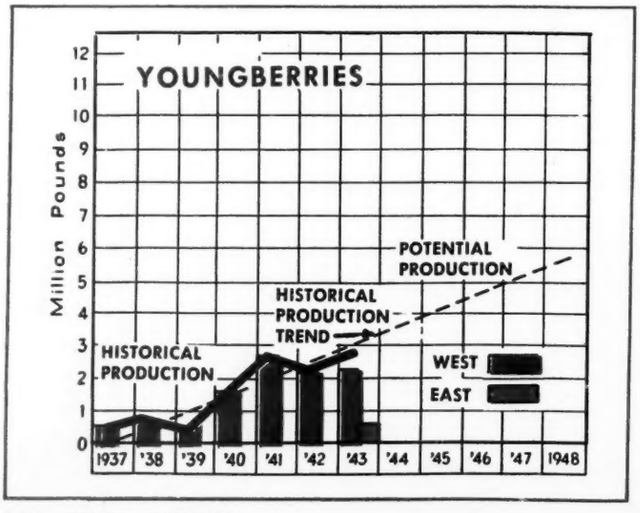
That the reader may evaluate the possible future potential production of strawberries, the dotted curved line is added. This curve indicates the approximate tonnage that might have been frozen had production continued without interruption by wartime conditions.

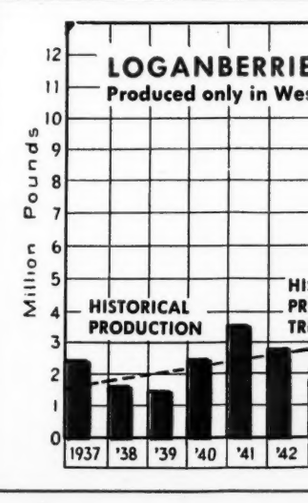


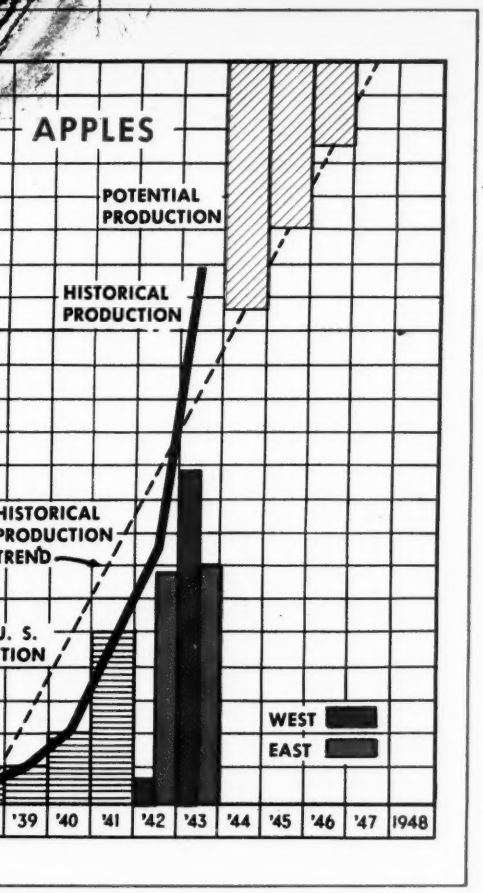


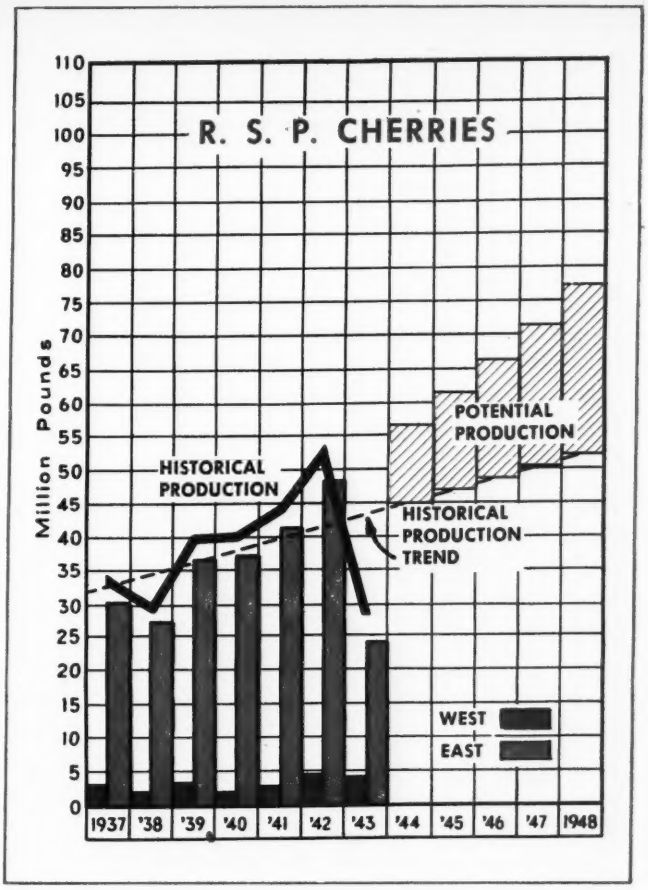


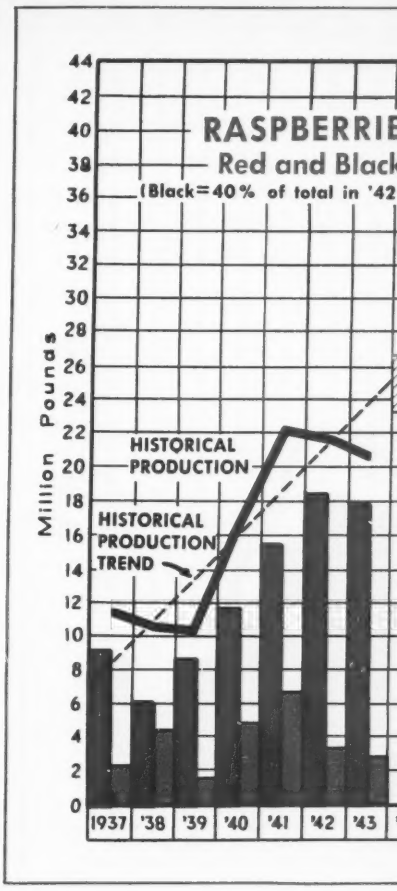


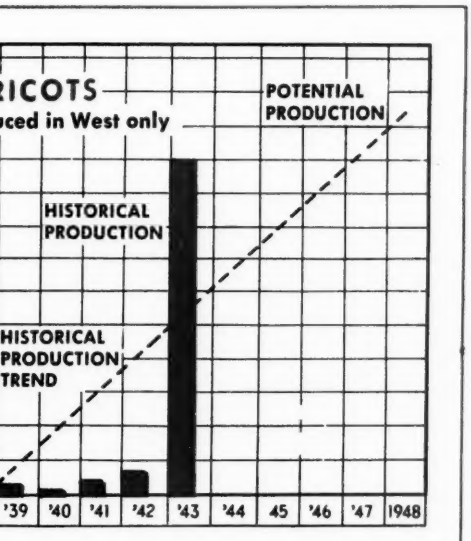


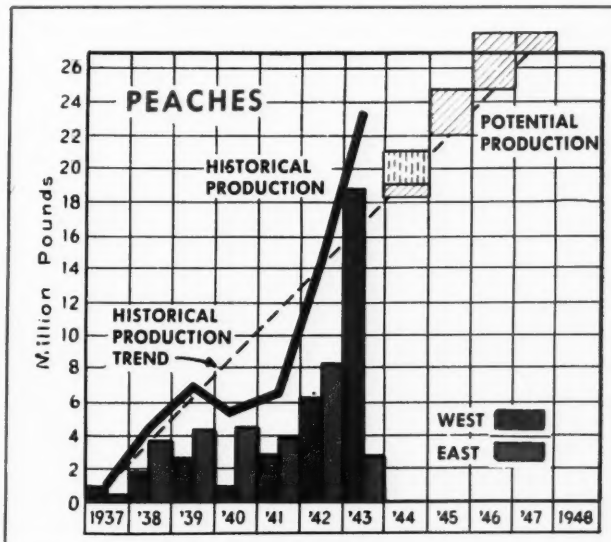


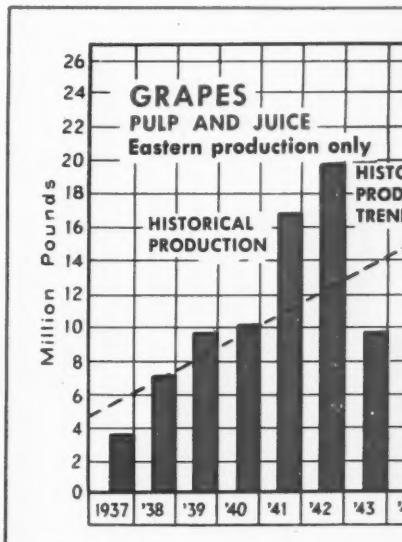

APPLES
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
WEST
EAST
'39 '40 '41 '42 '43 '44 '45 '46 '47 1948

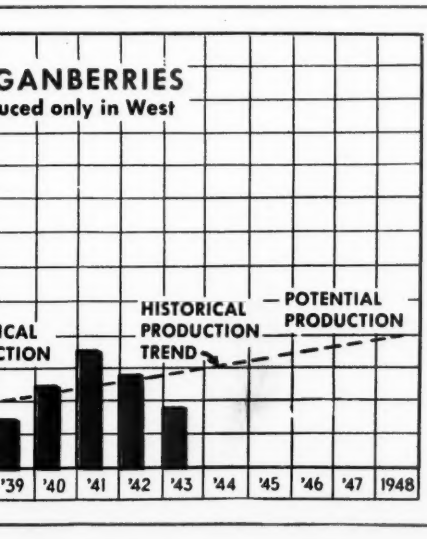

R. S. P. CHERRIES
Million Pounds
HISTORICAL PRODUCTION
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

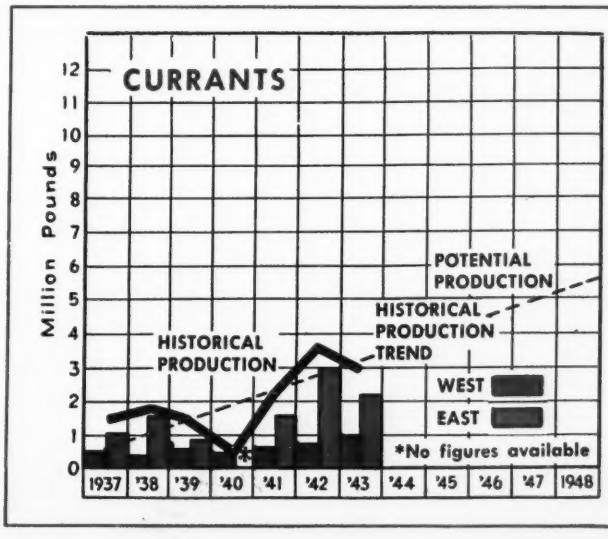

RASPBERRIE
Red and Black
(Black=40% of total in '42
Million Pounds
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
1937 '38 '39 '40 '41 '42 '43

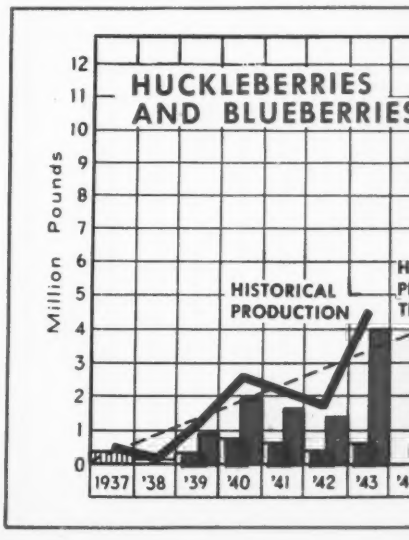

RICOTS
uced in West only
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
'39 '40 '41 '42 '43 '44 45 '46 '47 1948

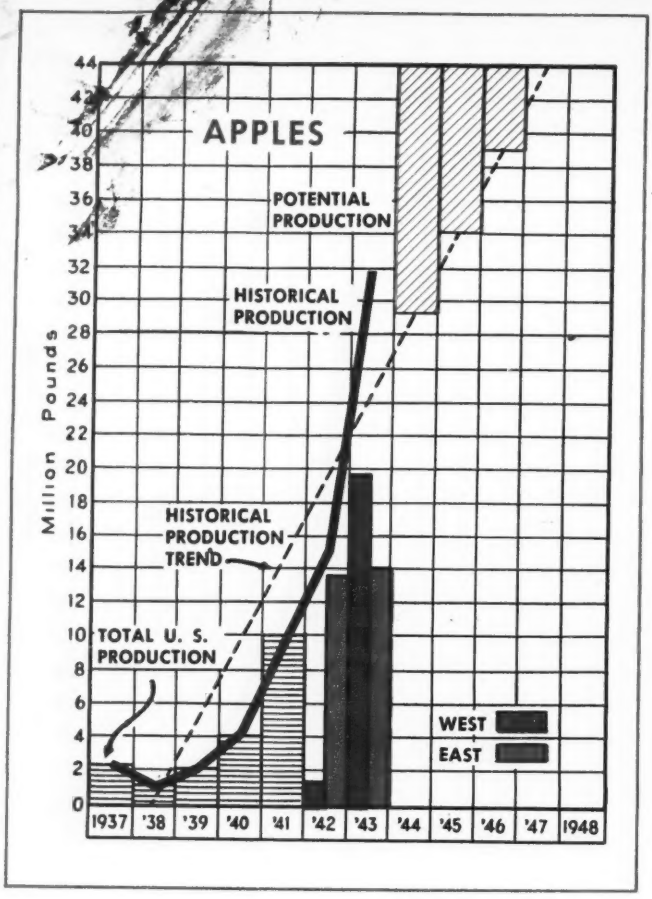

PEACHES
Million Pounds
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

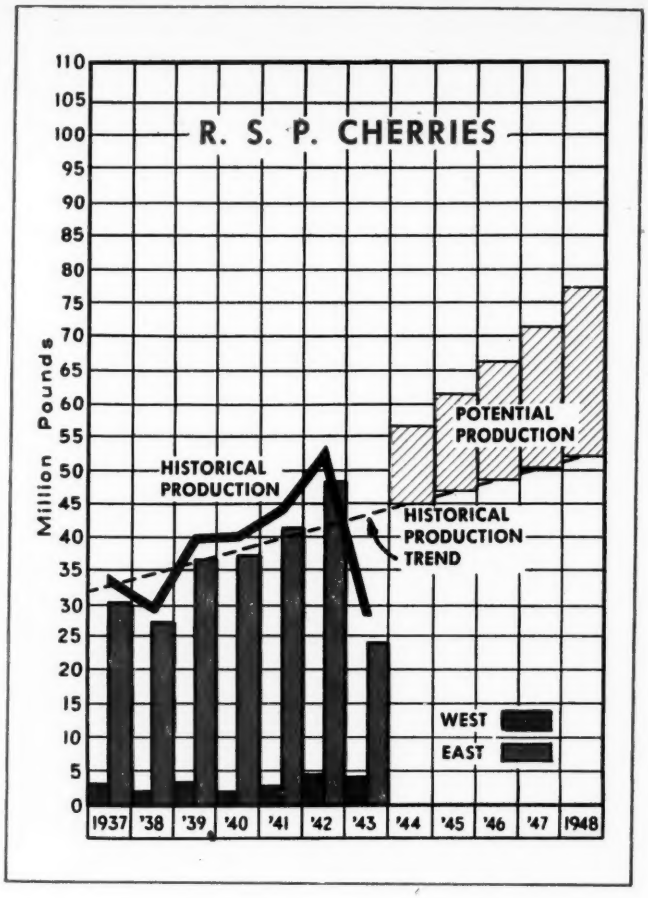

GRAPES
PULP AND JUICE
Eastern production only
Million Pounds
HISTORICAL PRODUCTION
1937 '38 '39 '40 '41 '42 '43

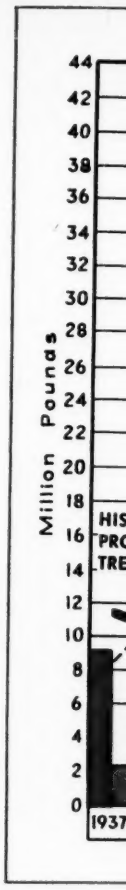

GANBERRIES
uced only in West
HISTORICAL PRODUCTION TREND
POTENTIAL PRODUCTION
'39 '40 '41 '42 '43 '44 '45 '46 '47 1948

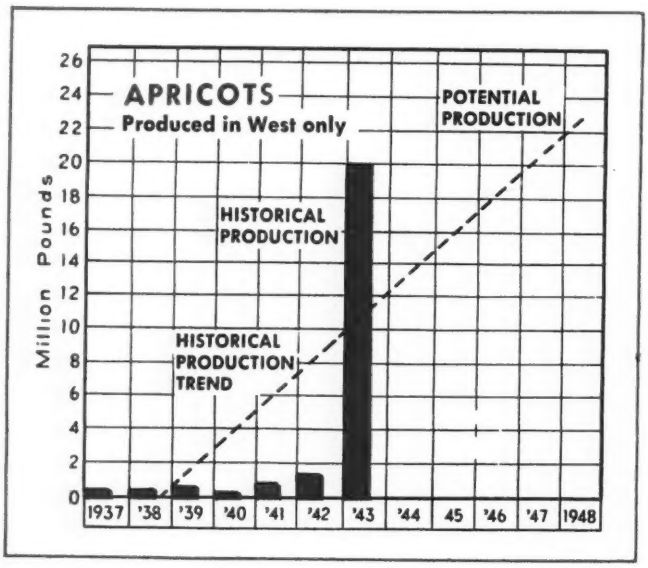

CURRANTS
Million Pounds
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
HISTORICAL PRODUCTION
WEST
EAST
*No figures available
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

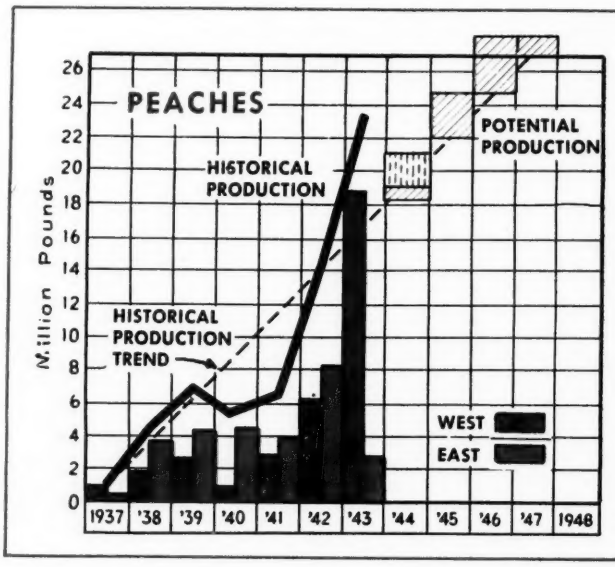

HUCKLEBERRIES
AND BLUEBERRIES
Million Pounds
HISTORICAL PRODUCTION
1937 '38 '39 '40 '41 '42 '43

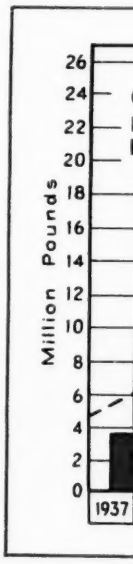

APPLES
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
TOTAL U. S. PRODUCTION
WEST
EAST
Million Pounds
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

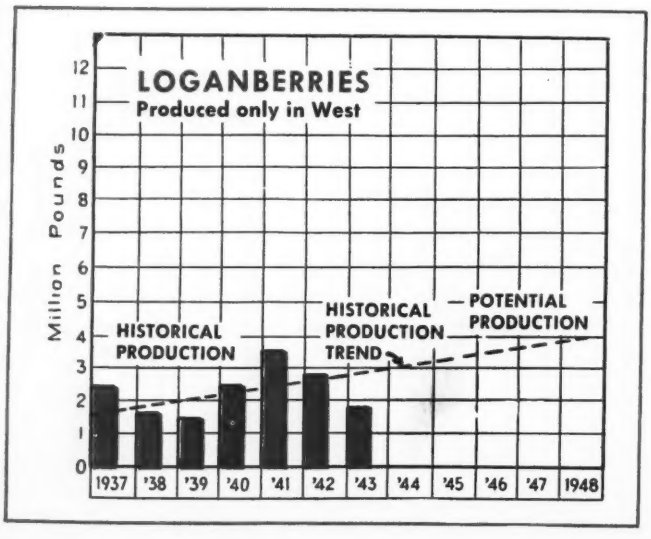

R. S. P. CHERRIES
HISTORICAL PRODUCTION
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
WEST
EAST
Million Pounds
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

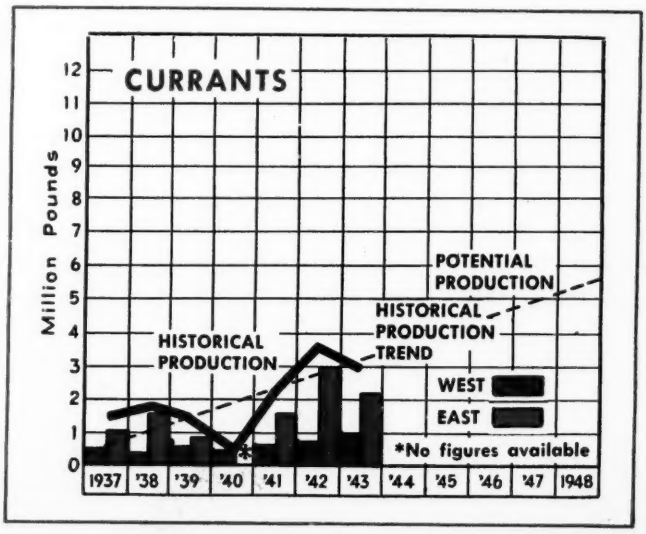

Million Pounds
1937

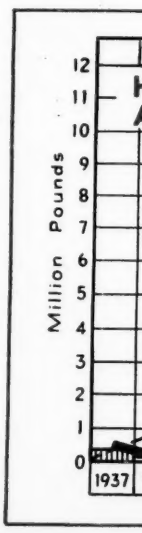

APRICOTS
Produced in West only
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
Million Pounds
1937 '38 '39 '40 '41 '42 '43 '44 45 '46 '47 1948

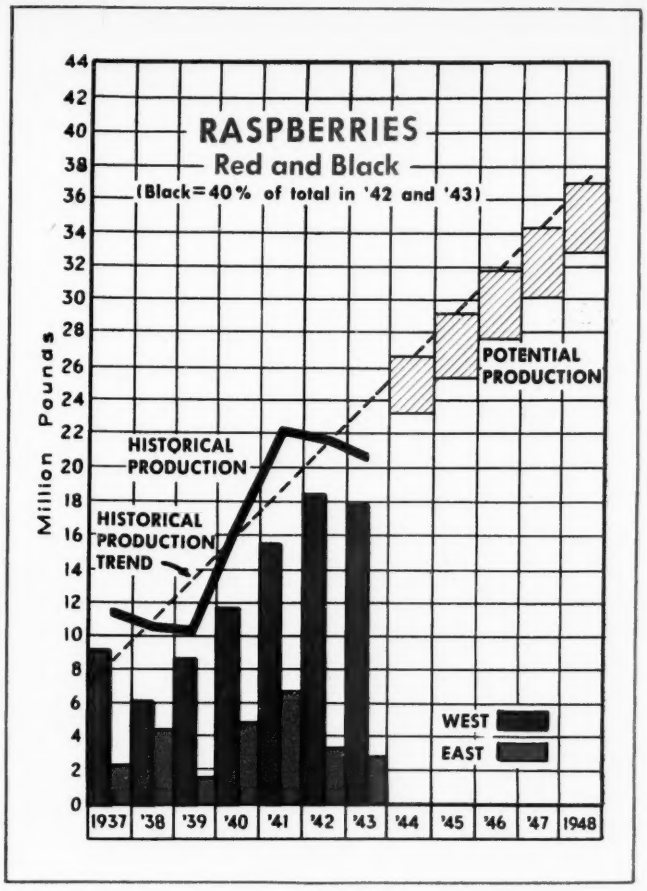

PEACHES
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
WEST
EAST
Million Pounds
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948

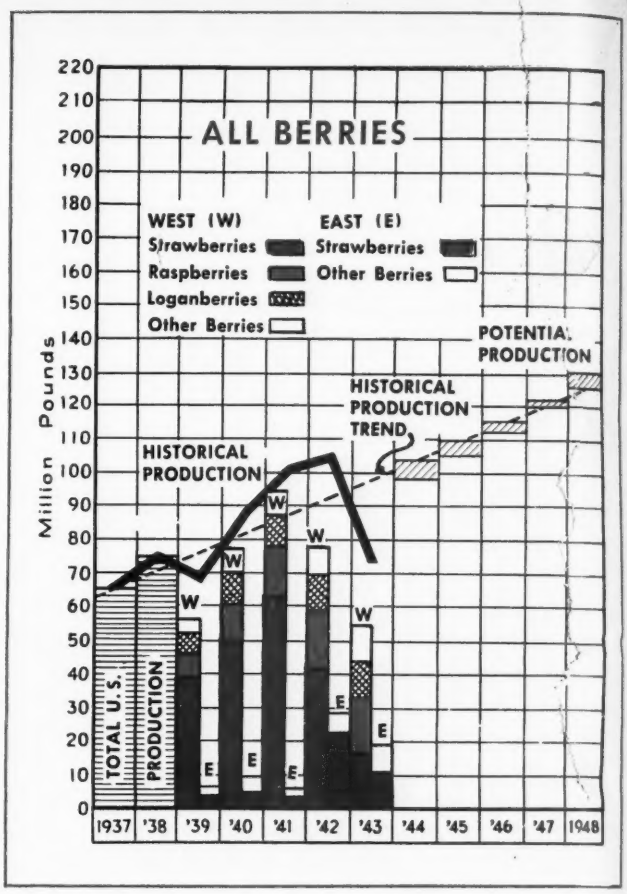

Million Pounds
1937


LOGANBERRIES
Produced only in West
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
POTENTIAL PRODUCTION
Million Pounds
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


CURRANTS
POTENTIAL PRODUCTION
HISTORICAL PRODUCTION TREND
HISTORICAL PRODUCTION
WEST
EAST
*No figures available
Million Pounds
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


Million Pounds
1937


RASPBERRIES
Red and Black
(Black=40% of total in '42 and '43)
Million Pounds
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
POTENTIAL PRODUCTION
WEST
EAST
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


ALL BERRIES
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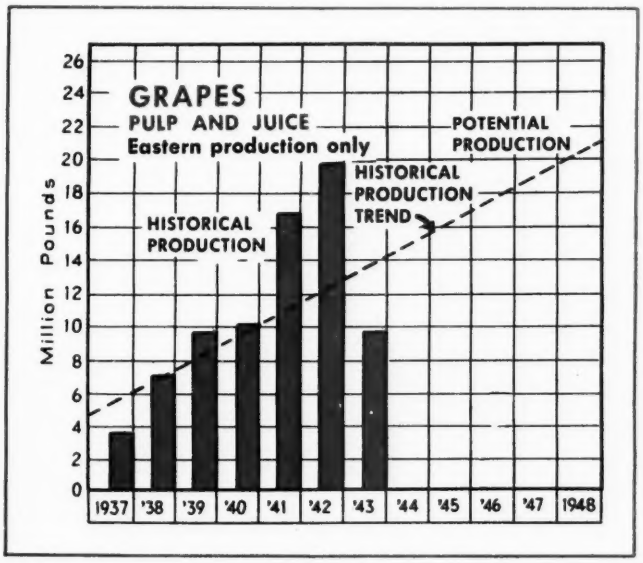
GRAPES
PULP AND JUICE
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HISTORICAL PRODUCTION TREND
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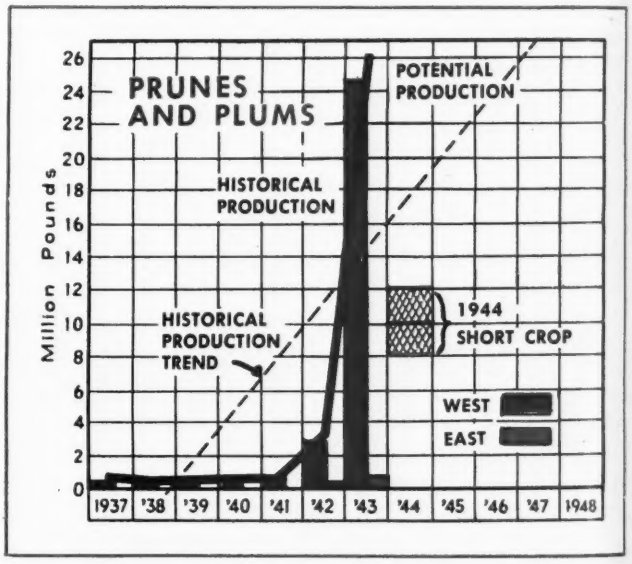
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Million Pounds
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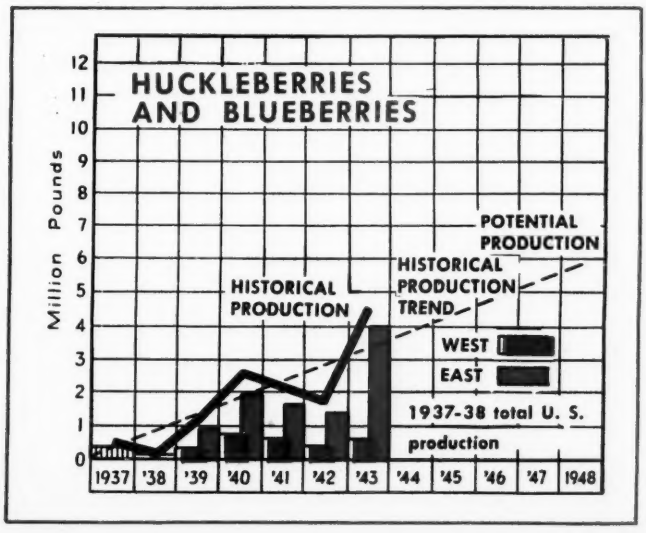
HUCKLEBERRIES AND BLUEBERRIES
Million Pounds
HISTORICAL PRODUCTION
HISTORICAL PRODUCTION TREND
POTENTIAL PRODUCTION
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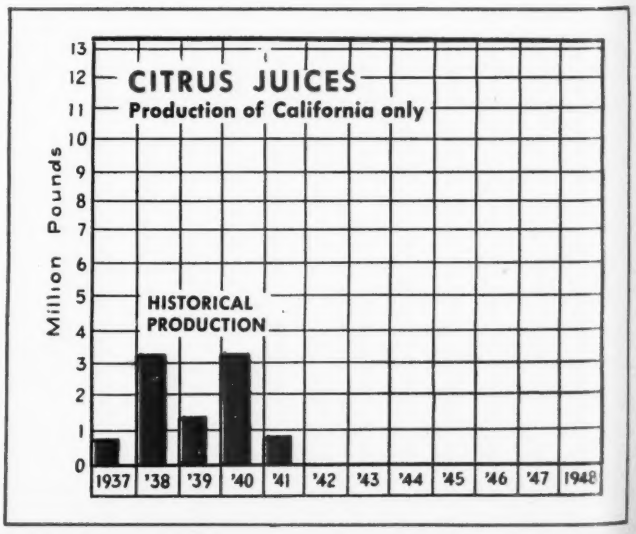
1937-38 total U. S. production
1937 '38 '39 '40 '41 '42 '43 '44 '45 '46 '47 1948


CITRUS JUICES
Production of California only
Million Pounds
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Progress and Prospects Of the Frozen Food Industry

The significance of the preceding charts is interpreted here, and the past, present and future pictures of the frozen food industry are analyzed, product by product, problem by problem. This is the answer to the current question—What's the future for frozen foods?

THIS industry, like all others, is the product of an evolutionary past, and during its short life environmental influences have shaped its present size and structure. Historical production figures, although sometimes conflicting, long have been available from various sources. For the purpose of evaluating or studying production trends and potential expansion, a composite of all available figures are utilized herein.

Historical and projected trend lines are plotted on the charts (pages 84 to 92) from the result of a mathematical average of known production output figures, a method commonly used for this purpose.

Under "Potenial production," the shaded areas that surround the projected trend lines in the years 1944 to 1948 indicate that the maximum or minimum production for each specific year may fall anywhere within these areas. This production variable is the result of projecting an average of the percentage of increase in annual historical production. The base production output figure is an average for at least the last three years. To this base the average percentage figure is applied cumulatively for the years 1944 to 1948.

Available production figures are confined to the past 19 years (1925-43) for fruits and to the past 11 years (1933-43) for vegetables. For individual product charts only seven years of accurate production figures are available (1937-43). Because of the lack of a more complete historical background, it must be recognized that impressions derived from a study of this material are limited and suggestive rather than conclusive.

For practical purposes, the production history of the industry (chart on page 84) is divided into two sections. These two phases of industrial progress are called the "period of experimentation" and "period of rapid growth."

Period of Experimentation

Characteristic of all industrial growth is the relatively small production of frozen fruits and vegetables during this period of experimentation (1925-36 inclusive). It was during these years that the industry experimented with raw materials, developed processing methods and went through the evolution from hand labor to original machines and thence to more efficient mechanical equipment. Packaging, storage, distribution and marketing posed problems of varying magnitudes for the pioneer frozen food packer.

From this industrial uncertainty, technology began to evolve an industry that could function and produce finished products of desirable quality. Practices, methods and machines were on the way to becoming standardized. Varietal problems affecting the selection of raw produce were being solved. New packaging materials, methods and machines were under experiment, and refrigerated storage and distributional problems were being worked out. Scientific research, as usual, had much to do with these developments, and the young industry was fortunate in attracting the attention of a number of investigators who posessed a pioneering spirit and unusual determination.

Just as rapidly as these improvements were adopted by the industry at large, and the resulting refined products presented and recognized by the public, consumer demand increased for frozen foods.

Any concept of the future magnitude of this industry must be based upon a fair knowledge of its history. Unfortunately, space restrictions will allow only a brief outline in this respect. However, many of the environmental influences experienced during the first 12 years of experimentation were reflected strongly in the "period of rapid growth." Since it is reasonable to expect that some of these will exert a direct control over the industry's future expansion, those of major importance are given consideration here.

The early output of fruits and berries were "cold packed." And most of the pack, put up in barrels and other large containers, was used by the baking and preserving trades.

The fluctuating production during 1925-36 was due, in part, to a lack of consistent consumer demand and to unprofitable contracts made with growers by packers. Strawberries comprised the largest part of the pack, and when the sale of crops to packers proved unprofitable, growers abandoned or ploughed-under fields of berry plants.

Package Pioneering

The sale of frozen foods in consumer-size cartons was largely pioneered by packers of frozen vegetables, beginning about 1933. It was not until 1935 that a significant quantity of frozen fruits was packaged for this trade. Rapid technological strides in the handling and freezing of raw materials have occurred since this time. Originally, the product was prepared and packaged in cartons, then cased—12 or 24 to the case. The case then was placed in the freezing room until such time as the product was considered to be frozen.

This was an obvious adaptation of the old cold-pack method, and it was not until 1931-34 that special methods and equipment for freezing were developed for consumed-size packages. Other mechanical improvements were adopted with this processing refinement, and some were even responsive to specific peculiarities in the preparation and processing requirements of individual products.

Experimental work on frozen vegetables was in full swing during

the early 1930's. But it was not until the packers and the public were reassured of the safety of the product from the public health standpoint that real production output began. The first vegetable pack of any significance was frozen in 1933, and in 10 years the output soared to a point above that of fruits (1943).

The years of 1936-37 brought an increasing demand for frozen foods, and to meet it, production output was heavily increased in 1938. However, plants still were relatively small, and full appreciation of the technological requirements of the process was not universal. Unfortunately, profit motives submerged those of quality control in some instances, and the 1938 pack, containing some low-quality merchandise, was sold to customers who anticipated products of high quality. The result was a decline in consumer acceptance in 1939. Not until about 1941 did the industry regain its stride. (The business recession of 1939 also intervened and was a lesser factor in this momentary recession.)

Fruit and Vegetable Production Trends

Historical production trends of frozen fruits and vegetables (chart on page 84) indicate that a rapidly increasing demand has effected a continuing increase in production. This industrial growth was in progress during the years before World War II. During this time, other processed food products were vigorously advertised and merchandised. But only one frozen food company had found it possible to engage in advertising of national scope, while a few others were using regional programs in a very limited manner. The greater portion of frozen foods was then being sold through brokerage houses, and it was a rare occurrence to find more than one salesman—usually the sales manager—employed by a frozen food company. Retail cabinets were not always of the display type. Products were not always of highest quality. And yet prewar sales of frozen food rose rapidly, through consumer acceptance and demand, and without the aid of widespread advertising and merchandising programs.

The production of frozen fruit began to exceed that promised by the trend line as early as 1940 and that of vegetables in 1942. However, contrary to some enthusiastic estimates on the progress of the industry during the past two war years (some estimates were that the industry had experienced a 5 to 10 year normal growth during the past two war years), these trends show it to be only two to three years in advance of normal growth.

The fruit and vegetable trend lines, when projected into the future (1944-48), cross each other in 1945. This seems to indicate, from a historical trend basis, that vegetable production would exceed that of fruits during 1945. However, this condition occurred in 1943. That probably is due to several factors, but largely to increased civilian demand, allocations of frozen vegetables to the armed forces and the decline in strawberry production.

Period of Rapid Growth

With many of its primary problems solved, the industry seems to have entered into a period of rapid growth about 1937. War's needs for frozen foods created one of the largest single factors in recent progress. Requirements for our armed forces for 1942-43 were estimated at 32,000,000 lb., of five vegetables. In 1944, this new customer demanded upwards of 75,000,000 lb. of frozen foods. No matter how large government allocations have been, consumer demand also has increased to a point where the industry now is unable to meet it. This pent-up demand for frozen foods could become a major crisis in the life of the industry when the floodgates are opened. Such a condition must be recognized by the industry and treated as a serious future problem.

Frozen vegetables allocated to our armed forces are packaged in relatively large containers. After subtracting these commitments from the total vegetable production for the two years and separating the remaining volume as to institutional and retail packs, the results show that the retail-size pack increased 13 percent in 1943 over the year previous. A two-year history cannot become a trend. But it is indicative, in this instance, of a growing demand reflected by civilian customers. During these same years, the civilian institutional pack was nearly 33 percent less in 1943 than in '42. The reasons for this are largely contained in the characteristic differences in the two markets. Large institutional buyers usually purchase foods on a basis of quality and price, and their business is gained or lost on this basis. But these same problems do not exist to such a strong degree in retail markets. Besides this, it seems that packers have come to the conclusion that now is the time, while markets are firm and demand strong, to develop consumer preference and entrench the demand for brands in favorable markets. It is probably from this standpoint that the current production swing is to retail-size packages. This condition should be somewhat equalized when packers are released from their government commitments. Then, both institutional and retail packs will in crease.

This increased demand and industrial movement towards the consumer market has other implications. Foremost among them are:

1. The inherent quality of frozen eggs is being better enhanced, generally, through utilization of higher grades of raw products and a closer adherence to trade and government standards.
2. The industry is establishing its own technological standards, and packers, for the most part, are holding to them.
3. The number of products offered to consumers and institutional trade has been increasing continually.
4. Refrigerated storage and distribution facilities have been improved so that the food now arrives at its destination in better condition than in the past.
5. Nutritional values of frozen foods are becoming more generally known.
6. A constantly growing number of consumers now recognize the quick utility of these foods and have a better knowledge of how to handle and use them.
7. Frozen foods have lost their "class distinction." Their buying public is composed of all classes. Since people have money to spend and a strong appetite for quality foods, the demand for frozen foods is increasing.
8. Relative net values are becoming known—from the standpoint of the net weight of frozen foods in the carton, the waste and trimming losses incurred with fresh produce, comparable retail prices, and so forth.
9. Food rationing and the shortage of other processed foods create a favorable market for frozen foods. Their easy availability and low ration-point value—or no points at all—created a situation similar to a huge national sampling campaign. In many respects wartime regulations proved an asset to this industry.

Even in the face of these factors —all of which seem to point toward an unpredictable increase in production expansion and consumer de-

mand for frozen foods—there are inevitable economic rules that govern sound planning for the future. One of the most important of these rules to be observed by packers is that of balancing production with consumption. In normal times, for a conservative and gradual growth, these two factors would be increased simultaneously. However, it is possible that postwar expansion and increased production will occur in a relatively abrupt manner. It is for this reason that packers should consider the plans of allied industries and manufacturers, upon which the healthy expansion of the frozen food industry largely depends. All those having a commercial interest in the industry will be affected by underproduction or overproduction of frozen foods in the early postwar days. Conservative progress and justified industrial growth make imperative an integration of the forward plans of all interested in production, distribution and marketing.

The Potentials

The heavy broken trend lines for fruits and vegetables in the chart on page 84 portray production during the last seven years and seem to show the potential trend of production—1944-48—in a more reasonable manner than do the longer range historical trend lines. The seven-year period of the industry's growth was selected for this purpose, as it more appreciably indicates that expansion and production really got under way during this time. Many initial problems of an imperative nature had been solved. And, along with increasing production output, due to new and better materials and greater efficiency in machines and equipment, a better quality product was being produced. The probable maximum or minimum annual potential production for 1944-48 is indicated in these years by colored areas surrounding the projected trend lines.

The scope of fruit production appears as the solid blue and red cross hatching and that of vegetables in red vertical lines (these extend through the cross hatching). The broken horizontal lines indicate probable fruit production due to known or expected decreases in production.

The production of fruits in 1944 currently is estimated at less than that indicated by the solid blue and red cross hatching for this season. The reasons for this are (1) the heavy decline in strawberry production, (2) short fruit crops and (3) wartime congestion of refrigerated warehouse space which led to government curtailment of the space available for the storage of such frozen fruits as sliced apples and prunes. Labor conditions, too, have taken their toll of the production of frozen berries, which comprised an average of around 40 percent of the total fruit pack in normal times.

The minimum of fruit production for 1944, as shown by the blue lined area on the chart in page 84, could be as small as 215-220 million pounds, and the maximum might be around 270 million pounds. Vegetable production (red lines), shows a possible minimum production of 230 million pounds and a maximum of 295 million.

Of course, weather and other factors will exert a telling influence upon these projected production trends during the coming four years. The country as a whole has been favored with an unprecedented succession of good crop years, and such a condition is not likely to persist indefinitely.

The maximum potential production of fruits and vegetables for the years 1946, '47 and '48 is not shown on the chart referred to above, although minimum production indicates a continued healthy increase. The figures for the unplotted maximum output indicate that, if the industry continues its present rate of growth, there is a good possibility that it may double its present size within the coming five years. But unless war ends within this period, the limitations imposed upon any industry by emergency measures may tend to retard free growth.

It probably will require at least two years for the industry to step up production to any appreciable figure after the free flow of materials permits expansion and building.

The total combined U. S. production of frozen fruits and vegetables from 1933 to 1943 is shown by the heavy curve above the production bars (chart on page 84). Prior to 1933, the available production figures deal only with fruits, which is shown by the blue bars.

Product Charts

Among the 30 fruit and vegetable product charts, shown in the fold-out insert (pages 87 to 92), only 12 show an annual production of over 20 million pounds each. Of these 12, the two most important prewar products, from a production volume standpoint, were peas and strawberries. Since 1942, strawberry production has been curtailed, not only because of labor conditions but because a large part of the acreage usually planted to this product has been replanted to some other not so closely and unprofitably controlled by price restrictions. With respect to tonnage, the frozen cherry pack now leads in fruits.

The "big five" of vegetables (lima beans, snap beans, cut corn, peas and spinach), so called because of their relatively large tonnage, provide a most suitable barometer for evaluating the progress of the industry over the past seven years, 1937-43. Total production curves of all five of these products bear a marked resemblance. With the exception of spinach, which was not produced in large tonnage in 1938, the output of the other four in that year shows an increase over that of 1937, only to decline in 1939. The influences causing this decline were mentioned previously. The years 1940 to '43 show the production curve of all five products moving rapidly upward.

With the exception of peas, the East has consistently produced more of the big five of frozen vegetables than has the West. Product charts show, in accurate detail, the production of these vegetables.

Space limitations will not permit consideration of all 30 of these products in detail, so comments are included only for those seeming to have the greatest bearing on the future potential production and expansion of the industry.

Peas—Technologically, the production of frozen peas has proceeded at a much more rapid pace than that of any other frozen vegetable. This accounts, largely, for the sustained and increasing institutional and consumer demand for the product. Of course, peas as a vegetable needed no introduction to the general buying public. The characteristics of this vegetable made it possible for the industry to develop the most highly mechanized flow line used for any product that is now being frozen. Most hand work can be eliminated throughout all the major agricultural and processing functions except, in some instances, that of grading. Peas are mowed, vined, prepared for freezing, frozen and packaged largely mechanically. When lines as efficient as this are developed for other products, lower production costs and increased volume should result. And with a quality product, consumer demand should grow.

Peas are also the vegetable of greatest importance, with respect to

tonnage, in the canning industry. But contrary to the per capita civilian consumption of the other big five vegetables, the heaviest consumption of peas is from cans, not as a fresh product.

The future production expansion of peas resembles that of the other big five vegetables, with the curve pointing abruptly to a higher output. This same pattern of increasing potential production is markedly noticeable in many of the product charts. Such a consistent and general historical production growth (except for cob corn) seems to give assurance of consumer acceptance and demand. And when this trend is projected into the years 1944-48, the potential growth seems justified by the historical record.

Approximately 30 percent of the total pack of peas is packaged in cartons of 1 lb. or less (principally 10 or 12 oz.).

Lima Beans—The year 1943 was a poor crop season, with a resulting drop in freezing production. The output for 1944, not yet announced, should be at least as high as that shown on the chart. Production problems have largely determined the expansion of lima bean tonnage. Rapid strides made recently in this direction may have the effect of bringing about a more abrupt increase in potential production than is shown here. Consumer preference for the Fordhook and all green types is growing, but full knowledge of their behavior and capacity for producing tonnage is not yet available for all regions. The East freezes the largest portion of the total pack, with one-third of it going into 12-oz. cartons.

Snap Beans (Green and Wax)—With respect to tonnage, this is the third largest canned vegetable, which during the past seven years (1937-43) has increased in production from around 10 million to nearly 23 million cases (basis 24/2's). The output of frozen beans has increased during the same period by some 20 million pounds, and yet per capita civilian consumption of fresh beans greatly exceeds that of the processed items. Because of the rapid increase in frozen bean output during the past three years, potential production shows good possibilities. However, certain economic factors control the output. Besides, frozen snap beans do not possess outstanding characteristics of quality in comparison with canned beans. Hence, competition of the canned and fresh products is to be reckoned with more than for some other frozen vegetables. Approximately 32 percent of the total pack is in cartons of 1 lb. or less (principally 10 or 12 oz.).

Cut Corn—Production and technological problems account for the slower increase in the output of corn. However, relieved of these, this product should deserve stronger consumer demand. Corn, with respect to tonnage, ranks second among canned vegetables, and about 25 percent of the per capita civilian consumption is from cans. In the sale of this product, postwar competition with frozen and fresh foods will resemble that of snap beans. As to potential production, it is possible that the frozen corn output will outstrip that shown on the chart. Consumers are just recently accepting it in larger quantities (1941 through 1943), which is a good pointer to its future potential. About 30 percent of the pack goes into 10 or 12-oz. cartons.

Spinach—A strong demand for frozen spinach did not begin until 1941, and since that time, with increasing consumer acceptance, production has grown from 4 to nearly 30 million pounds. This is the fourth most important canned vegetable, with respect to tonnage. But per capita consumption of fresh spinach is nearly three times that of the canned product. Potential production shows a good future possibility for spinach. Since the raw material is readily available, its increased sales volume probably will depend upon advertising and merchandising a quality product of reasonable price. About 44 percent of the total pack is in cartons of 1 lb. or less (principally 12 or 14 oz.).

Asparagus—Considered generally as one of the luxury or class items, asparagus is relatively one of the most difficult vegetables to freeze because its texture is considerably affected. An improved finished product at lower prices could create large consumer demand. Canned asparagus accounts for about one-third of the civilian per capita consumption. Since the frozen pack is small, most of the other two-thirds of the total production is consumed fresh. Approximately one-third of the total frozen production goes into cartons of 1 lb. or less (principally 10 or 12 oz.).

Carrots—The principal reason that carrots have experienced the small growth in production shown on the chart can be attributed largely to a shortage of kitchen help in institutional outlets. Being a root vegetable, it is available to consumers nearly the year around from the fresh market and at reasonably low prices. A small part of the pack is used to combine with peas to make peas and carrots. A bare 3 percent of this vegetable is packaged in 12-oz. containers, the remainder going into 2½-lb. cartons or larger. The future growth in production is problematical.

Cauliflower—The preparation of cauliflower for freezing requires considerable hand labor, which boosts the production cost. The losses in trimming and waste were relatively heavy due to established methods, or trade standards, used in packing the frozen vegetable; since the war began, retention of a greater amount of edible portions has been encouraged.

More modern processing and handling methods, aimed at reducing waste and costs, might serve as an incentive to increase production. A lower priced, quality product should meet with consumer acceptance. Since cauliflower is not canned, competition would be only with the fresh product. Approximately 25 percent of the pack goes into cartons of 1 lb. or less (principally 10 or 13 oz.).

Corn on the Cob—This is primarily a frozen food novelty based on American food preference. The retail selling price has not been unduly high, but consumer demand has been relatively light. To assure good keeping quality, the product requires prolonged blanching to give full heat penetration into the cob tissue. This affects the quality of the finished product, and the weight of the inedible cob provides a shipping problem. Production output during the past three years has declined, with the prospect that it will dwindle still farther in the future.

Broccoli—Potentially, this product has big possibilities. It is one of the best vegetables for freezing because of the quality, texture and color retention of the finished product. The two major problems facing packers of this vegetable are those of pest control in the field and the amount of hand labor required in preparation and packaging. The quality and usage of this frozen vegetable are gradually becoming more widely known, and future educational programs could increase consumer demand to an appreciable extent. The largest part of the total pack is frozen in the West, with approximately 25 percent going into cartons of 1 lb. or less (principally 10 oz.). As broccoli is not canned, its per capita consumption is mostly in the fresh state.

Brussels Sprouts—The West freezes approximately 98 percent of this product, with around 25 percent of it going into cartons of 1 lb. or less (principally 10 or 13 oz.). The problems facing packers are similar to those encountered with broccoli. The potential consumer consumption of this product is good. New methods of packing and an educational program should bring its production to new high levels. By far the largest part of the civilian per capita consumption is of fresh brussel sprouts.

Other Vegetables—Many of the products listed under this classification are experimental or specialty packs. Others are definitely war babies which, in all probability, will not be packed postwar. A list of them includes artichokes, beets and beet greens, broccoli greens, celery, collards, kale, okra, pimientos, peppers, soybeans, Swiss chard, succotash, tomatoes, tomato juice, tomato puree, turnip greens and mixed vegetables.

Some of these vegetables now show a definite postwar potential. Following the completion of experimental

work on them, it is entirely possible that perfected products will develop good consumer demand. The potential usefulness of root crops seems to be in mixed vegetables and cooked frozen foods.

Regional preferences for certain vegetables, such as leafy greens and black-eyed peas in the South, and a future interest in the excellent quality of the green edible soybean, when frozen, may bring these into future prominence.

Frozen baby foods, now in the early stage of experimentation, should have a strong postwar potential, if only because of the high nutritive qualities retained in the products. Considerable technological work remains to be done with such products. Quality and bacteriological control during the processing phases are of paramount importance. This field invites the attention of progressive packers. Because several frozen food concerns now are investigating the production of baby foods, such products should appear in retail outlets in the very near future.

The development of products that are new foods to the general consuming public will require time. But among the products that are not generally known are some that seem to have good possibilities. Fruit purees and chopped vegetables (such as broccoli, cauliflower, asparagus, and so forth) have already found good consumer acceptance in first marketing trials.

The utilization of fruit and berry purees in the remanufacture of food products has grown, even recently, to interesting proportions.

Peas and Carrots—The production of this vegetable combination has never been large, either in cans or frozen. The rapid upward curve in 1943 is due, in all probability, to wartime demand only. Practically all of this pack goes into 12-oz. cartons, with about 2,000 lb. in 2½-lb. packages.

Squash and Pumpkin—The West produces about 80 percent of these two products, which in 1942 were packaged almost entirely in 16-oz. cartons. However, 1943 production was about evenly divided, with half of the increased pack going into institutional-size cartons. Tin restrictions imposed upon the canning industry probably accounted in large measure for this new demand. Whether the demand will continue postwar remains to be seen. Indications are that most of the pack was used by the baking trade for pumpkin pies and as a pie filler because of the shortage of other ingredients, notably fruits.

Strawberries—In 1943 the production of strawberries was down to the lowest level shown on the chart. This was due, mostly, to wartime regulations on growers' ceiling prices. With the current labor shortage, this made growing this berry unprofitable. As a consequence, the product, which in normal times is second to peas with respect to tonnage, is currently produced by the frozen food industry in a relatively negligible quantity. The West has been a consistent producer of over half of the entire pack, and in that region the removal of Japanese growers was another cause for curtailed production. Consumer markets are broad and strong for strawberries. Preservers, ice cream manufacturers and the fountain trade use the bulk of the institutional pack. There is a definite pent-up demand for this product, and when wartime controls are relaxed and the acreage replanted and bearing, production should increase considerably and consistently.

The historical production trend shown on the chart is largely influenced by the declining production of 1942-43. Consequently, the potential trend towards increased production is only moderate. However, so that the reader may gain some idea as to where the production output might be, had there been no war, the curved dotted line depicts potential production plotted from the historical production figures of 1937-41 only. It would seem a reasonable supposition that the postwar production output will return to a tonnage figure somewhere in the vicinity of this dotted line.

Due to the curtailed supplies of raw material, it is obvious that strawberry production will not fall within the potential production area in 1944 to 1948, unless war ends this year. Therefore, an estimated wartime potential production is indicated in the lower right corner of the chart.

Manufacturers of ice cream and preserves, finding their source of strawberry supply diminishing, have found it possible and profitable to freeze their own supplies. The extent of this pack, in pounds, is not known, but it is estimated to be of considerable size. Whether these former customers of commercial frozen food packers will again buy from prewar sources, or continue to pack their own fruit, is another postwar problem facing the industry.

Cherries, RSP—This is another institutional item, with only 5,000 to 7,000 lb. being packaged in cartons of 1 lb. for the retail trade. The East (Northeast and Midwest) produces approximately 90 percent of the total pack, which today is the most important fruit pack in respect to tonnage. Heretofore, it has ranked second only to strawberries. A poor crop caused the decline in frozen production in 1943, but the product shows indications of steady production gain in the future.

Apples—There is a strong possibility that the rapidly increasing potential production of frozen sliced apples, shown on the chart, may be a deceptive trend. Such a speculative future may not be due entirely to the quality and utility of the product, but rather to an institutional demand that has been influenced by wartime shortages of labor and sugar supplies. Postwar conditions may remove the current lack of labor, and sugar supplies ought to be off the restricted list. Being a low-cost item, this product does not lend itself to high-cost refrigerated transportation over long distances. Future plans of apple freezers should carefully evaluate these major current influences. Indications are that the total pack for 1944 will be smaller than that of '42. Storage space was restricted this season because the fresh fruit can be held safely in cool storage. Only about 4 percent of this pack goes into cartons of 1 lb., or under, the remainder being packed in institutional sizes (mostly 30 lb.).

Apricots—This is an exclusively Western product, with the largest proportion of the pack coming from California. Wartime processing and container restrictions may have influenced the increasing volume of this frozen fruit, which is used primarily for the baking and preserving trade. Due to its quality and utility when frozen, this fruit may maintain the high production figures set in 1943. Except for a few thousand 1-lb. cartons, the greatest part of the pack goes into 10- and 30-lb. cartons.

Citrus Juices—Historical production figures for this product are so meager that it is impossible to project a reasonably sound potential production trend line. The production shown on the chart is for California citrus juices only. War needs have curtailed the production of frozen citrus juice for this season, but packers and marketing men predict a good postwar potential for the product. Orange juice is very sensative to oxidation, with consequent loss of flavor. So careful processing and packaging control, as well as maintained low-temperature conditions during distribution of the frozen product, are essential. So far, the juice is pressed from only Valencia oranges. If technological progress can eliminate the bitter principle found in juice pressed from the Navel oranges, it would extend the operating season for juice freezers.

Currants—Exclusively an institutional pack, with all but a few thousand pounds going into barrels. Most of the production comes from the East. It is used largely by the preserving industry.

Grapes, Pulp and Juice—Another exclusive item for the preserving industry. Produced only in the East.

Peaches—With 70 percent of the total production of this fruit frozen in the West, packers are predicting even greater production in the future. The largest proportion of the pack is for the institutional trade, with a little over 20 percent of the total going into 1-lb. or smaller cartons. Prior

to 1944, packers used only freestone varieties. But to balance the loss of other fruit and berry production, a good size pack of clingstone varieties was frozen this year. These find use primarily in the baking trade and are quite satisfactory because of their texture retention during baking. Bakers are reported to prefer the more natural color of frozen peaches.

Prunes and Plums—The greatest proportion of this pack is produced in the West, with only a few thousand pounds frozen in the East. In 1943, about 7,000 lb. was packed in 1-lb. cartons, the remainder going into 10-lb. or larger cartons and the bulk of the pack into barrels. Due to a short crop (reported to be 50 percent less than that of 1943) and congested freezer space in refrigerated warehouses, the 1944 pack of these items is estimated at around one-half of that packed in the preceding year. The preserving and baking industries are the heaviest users of these fruits. Wartime needs influenced the 1943 pack, and potential production is problematical. However, plums are desirable for frozen puree.

Rhubarb—Sixty-five percent* of the total pack of this product is produced in the West, about one-third of it going into 14-oz. cartons and the bulk of the remainder into 30-lb. or larger sizes. The prewar pack was of such little consequence that no potential projection is made on the chart. It is primarily an item for the baking industry. (The chart for rhubarb is grouped with the vegetable charts.)

All Berries—An average of 40 percent of the total annual fruit pack is berries. But the utilization of berries by the freezing industry has been handicapped seriously during the past two years by lack of field labor. The greatly curtailed strawberry production is the most important factor contributing to the slump in total fruit production gain in 1944 over previous years. For the most part, all berries require a great deal of hand labor throughout harvesting and freezing. New machines and equipment that will provide a more continuous mechanical flow line should increase the production. Both the consumer and the institutional demands are strong for berries.

Raspberries (Red and Black)—Of the two varieties, red raspberries comprise approximately 60 percent of the pack. About 20 percent of the total production of both varieties goes into 1-lb.-or-under cartons, with the bulk of the pack going into barrels and 30-lb. containers. Today, the pack of these berries is largely a preserver's and baker's item, but it promises to become one of the major consumer-packed fruits. Raspberries are one of the most delicious of all frozen fruits, retaining their color, aroma and texture to a high degree when frozen in sirup.

Blackberries—With only a few hundred thousand pounds being frozen in the East, the West leads in blackberry production. The pack is largely of the Evergreen type, which thrives (although insect pests are a problem). About 97 percent of the entire pack goes into institutional packages, with the largest part being barreled. Potential production growth is indicated as moderate, although there is a good consumer demand. Attempts have been through plant breeding to obtain the rich flavor of the wild berry in the cultivated types.

Huckleberries and Blueberries — With the exception of a few hundred thousand pounds (mostly huckleberries) produced in the West, the East (Northwest and Maritime Provinces of Canada) is by far the largest producer of these berries. About 85 percent of the total pack of both berries goes into cartons of 10 and 30 lb. or larger. The pack is used largely by the baking and preserving industries

At one time, the West produced considerable tonnage of the wild Evergreen blackberries, but uncontrollable insect infestation almost completely put an end to the Western pack.

Loganberries—Because this berry when fully ripe is comparatively fragile and breaks down under handling, it generally must be harvested before it has fully matured. The immature berries are acid and rather lacking in flavor (though bright in color), and consequently have never seemed to attract a large consumer demand. Only a few thousand pounds are packed in 1-lb. cartons, the remainder going into institutional cartons, with the bulk being barreled. This berry is produced entirely in the West.

Youngberries—Another berry frozen largely in the West, with a relatively small production output. The largest part of the pack goes into 10 to 30-lb.-or-larger cartons and barrels, with only a few thousand pounds going into consumer 1-lb. cartons.

Other frozen fruit products (not portrayed on charts nor mentioned in the preceding text) are gooseberries, elderberries, feijoa, figs, guavas, mixed fruits, nectarines, orange puree, pears, persimmons, pineapple and tangerines.

These frozen fruits are produced in relatively small volumes in peacetime. They have been largely specialty products, although gooseberries have found some use in the baking trade.

Comparative Rate of Growth

To appreciate the progress and present stature of the frozen food industry, a comparison should be made with some other branch of the food industry. There is no other branch with identical problems, but the most natural comparison seems to be that with canned foods. And the only sound yardstick with which to measure the comparative rate of growth of frozen foods with that of the canning industry is found in the utilization of raw materials. For this purpose, the big five vegetables of both industries are selected.

Having had years to develop its production and distribution, the canning industry is much farther along in its period of rapid growth than is the younger frozen food industry.

Initial indications of a rapid growth in the frozen food industry began in 1937. And during the ensuing seven years, the free expansion of the industry was held in check by many factors. Most important were those concerning the technology of production and distribution and the lack of a free way to enter retail markets. All problems of this nature are not solved yet, and in this respect the younger industry is not currently on an even footing with the canning industry.

The chart at the bottom of page 85 gives a comparison. The bars showing canned and frozen utilization of the five vegetables start from the base line. They are not stacked, one on top of the other, but are superimposed.

The matter of competition between fresh, canned and frozen fruits and vegetables is looked upon with a divergence of opinions. Although frozen foods may compete more directly with the fresh produce, this does not necessarily mean that they will not compete also with canned products.

Industrial Expansion

Any consideration given to the expansion of the industry must study first the salient factors determining the successful growth of any industrial enterprise. Some of these economic essentials are known and native to certain regions. Others must be developed through industrial and marketing enterprise. Of them, the most important are: (1) the availability of high-quality raw material in abundance and at reasonable costs, (2) favorable plant locations with all essential facilities in close proximity; (3) sufficient skilled labor; (4) refrigerated storage and distributional facilities close at hand, and if possible, a location that is adjacent to, or the hub of, a number of large markets for frozen food products.

In its present state of expansion,

one of the most important problems facing the frozen food industry is the availability of sufficient high-quality fresh produce of the most suitable varieties. The chart at the top of page 85 portrays the regions in which the big five vegetables are currently grown for processing and the average costs per ton of each vegetable.*

Total frozen production leadership in peas has varied about equally between the East and West during the past 7 years, even in view of the higher yield-per-acre and low cost-per-ton of peas in the West. The heavy concentration of canning and freezing plants in Western pea producing regions has brought on a highly competitive situation for acreage suitable for the cultivation of this vegetable. This competition caused growers to seek to use all available acreage for peas. In fact, in one Western pea producing area, both canners and freezers recently have found it expedient to build new plants in other agricultural regions where peas can also be grown, although not as readily.

The matter of distributional costs, which are reflected in the selling prices of frozen foods, is an essential consideration in the study concerning the location of new plants. In this respect, cross-country refrigerated rail shipment can account for 1½ cents per pound. A higher price differential, for an identical product of like quality, often will cause consumer rejection in favor of the lower priced item.

Postwar Markets

The success of a conservative industrial expansion program for this industry will depend upon factors other than those concerning production and distribution problems. The two most important are (1) the preparation of markets to receive and safely dispose of this increased supply and (2) the creation of a larger consumer demand for frozen foods through advertising and merchandising.

Because of a relatively restricted sales volume, the wholesale distribution of frozen foods has been centralized, to a large extent, in the 138 wholesale markets of the nation. Due to the limited number of outlets with storage or display cabinets, this method—born of an economic necessity — was developed to provide a distributor with a sufficient number of buyers and a profitable sales volume. At the outset of the postwar period, this method of wholesale distribution probably will remain unchanged. As markets are expanded, it may become expedient to revise current wholesale territories, making them smaller and appointing more distributors to develop a more efficient and concentrated distribution of products.

Packers' future plans for market expansion are subordinate to the ability of refrigerated cabinet manufacturers to produce, and sell, retail, institutional and domestic units. Although a great number of equipment manufacturers plan to enter this field, it will take some time before volume production is reached. The selling, delivery and installation of units, too, will require time.

There undoubtedly will be a demand for institutional and domestic frozen food cabinets, but the most urgent need is in the retail field. By continuing the system of frequent deliveries to institutions, for a time, sales could expand in this market without storage cabinets.

There are no current figures on the total number of cabinets now in use in retail stores. However, one source estimates that there are only 30 to 35 thousand in all stores. Another source estimates that from 75 to 80 percent of the 10,000 super-markets have frozen food cabinets. In all, there are 10,000 super-markets, 32,000 chain store units and 350,000 independent retail grocers. In addition to these figures, there are some 6,000 frozen food locker plants, many of which have indicated their intention to stock and sell commercially packed frozen foods.

As is evident from these figures, most super-markets and some chain store groups are now merchandising frozen foods. By far the greatest part of the retail field, however, remains to be exploited by the frozen food and refrigerated cabinet industries.

The industry, in general, has not yet emerged from its experimental period in the advertising and merchandising of foods. The general sales pattern has followed that used by canners; that is, sales are made through food brokers or direct to the customer by the packer's sales representatives. Except for the programs of a few of the larger packers, advertising has been largely spasmodic and of the "hit-or-miss" variety. Merchandising has been seriously handicapped by the lack of large display-type cabinets and other display equipment.

The sale of frozen food items to consumers may not be confined to retail food stores. Door-to-door delivery is being tested currently

TABLE I—Estimated U. S. Civilian Per Capita Consumption of Selected Fruits and Vegetables

(Bureau of Agricultural Economics, U. S. Department of Agriculture)

	Season Beginning			
	1941	1942	1943	1944
***Fresh Fruits** (Used fresh)	Pounds			
Apples	30.90	26.67	25.16	26.91
Apricots	0.42	0.51	0.52	0.82
Cherries, red sour	0.92	0.95	0.82	1.27
Peaches	18.19	14.27	7.69	18.33
Plums and prunes	1.70	1.78	1.58	2.25
Strawberries	2.69	2.71	1.49	0.85
Total deciduous	....	....	61.08	79.88
Total citrus	....	....	59.74	67.67
****Canned Fruits** (Canned weight)				
Apples	1.00	0.65	0.51	0.52
Applesauce	0.91	0.92	0.78	1.04
Apricots	1.29	1.07	0.18	1.48
Berries (all)	0.52	0.29	0.31	0.05
Cherries (Swt.)	0.27	0.24	0.26	0.27
Cherries (RSP)	0.51	0.56	0.07	0.23
Peaches	3.87	4.11	2.51	1.49
Plums and prunes	0.43	0.25	0.83	0.54
Total deciduous	....	....	10.00	9.88
*****Fruit Juices** (Canned weight)				
Apples	0.17	0.29	0.27	0.18
Prunes and nect's	0.53	0.55	0.40	0.80
Citrus	....	....	3.76	6.69
Pineapple	....	....	0.98	0.91
Grapes	....	....	0.56	0.37
xDried Fruit (Processed weight)				
Apples	0.08	00	0.07	0.02
Apricots	0.17	00	0.04	0.12
Peaches	0.14	00	0.08	0.18
Prunes	0.97	1.87	2.39	1.88
Total deciduous	....	....	6.13	5.20
xxFrozen Fruits (Frozen weight)				
Blackberries	0.07	0.06	0.06	0.04
Cherries (RSP)	0.26	0.35	0.27	0.25
Raspberries	0.15	0.15	0.16	0.18
Strawberries	0.54	0.59	0.32	0.26
Other berries	0.13	0.07	0.07	0.09
Other fruits	0.24	0.38	0.56	1.04
Total deciduous	....	....	1.38	1.49
†Fresh Vegetables (Used fresh)				
Asparagus	1.7	1.7	1.59	1.53
Beans, lima	1.1	1.2	0.94	0.91
Beans, snap (gr. and wax)	8.8	10.5	10.31	9.29
Cauliflower	3.3	3.6	2.65	3.05
Carrots	12.1	12.1	13.34	12.08
Corn, sweet	16.3	15.7	15.47	14.88
Peas (green in shell)	4.8	4.8	4.58	4.48
Spinach	3.4	4.2	3.76	3.41
Total vegetables	...	...	236.21	249.70
††Canned Vegetables (Canned weight)				
Asparagus	0.63	0.65	0.64	0.72
Beans, lima	0.48	0.54	0.23	0.20
Beans, snap	2.31	2.99	3.46	2.80
Carrots	0.39	0.39	0.33	0.22
Corn	5.40	5.28	6.11	4.10
Peas	6.52	5.68	6.54	4.82
Pumpkin and squash	0.70	0.57	0.43	0.58
Spinach	0.73	0.95	0.94	1.12
Mixed vegetables	....	....	0.29	0.49
Total vegetables	....	....	‡35.46	‡32.55
Frozen Vegetables (Frozen weight)				
Totals	0.69	1.04	0.73	1.67

NOTE: All figures for 1943 and 1944 seasons are preliminary, subject to revision.

†Does not include canned soups, baked beans, baby foods and miscellaneous vegetables; includes bulk pickles and kraut converted to canned basis.

*Calendar year **Pack year ***Calendar year xPack year xxCalendar year †Calendar year ††Pack year

*Figures for this chart are BAE ten-year averages, 1933-42, and the products shown are grown for all kinds of commercial processing.

TABLE II—Per Capita Consumption of Canned Foods by Region

Region[1]	Fruits and fruit juices	Vegetables
	Pounds	
Pacific	33.0	45.2
Middle Atlantic ...	30.6	42.9
New England	30.5	35.7
E. No. Central.....	22.6	31.9
W. No. Central....	19.9	30.6
Mountain	17.9	28.8
W. So. Central.....	14.3	26.0
E. So. Central.....	13.8	23.5

[1]Regions correspond with wholesale distributor regions for canned fruits and vegetables, not census divisions. Source BAE.

in some locations, and the postwar plans of some fresh milk and ice cream companies include the addition of frozen foods to their regular line of dairy products.

Per Capita Consumption

A study of current frozen food per capita consumption in relation to that of other foods, and that of individual frozen products, is essential to a conservative evaluation of the extent to which the industry may initially expand in postwar.

Both fresh fruits and vegetables account for the greatest proportion of the per capita civilian consumption of these two types of foods, (chart at top of page 86). Canned fruits and vegetables account for the second largest portion. In fruits, the dried products are third and frozen fruits last. There is a larger proportion of canned vegetables than fruits consumed per capita, but both frozen fruits and vegetables are currently used about equally.

Some fruits and vegetables are heavily consumed in their fresh state, and in all probability, per capita consumption of some of these will not change soon. Of fruits, apples are the most important in this respect, and carrots provide a similar example in fresh vegetables. Nevertheless, it will require only a small percentage of change in the present total per capita consumption of all kinds of fresh and processed fruits and vegetables to accomodate a conservative expansion of the frozen food industry.

At the bottom of the chart are shown, in bar-chart form, all available records of annual per capita consumption of frozen fruits and vegetables. The consistent increases in these two charts indicate a continually strengthening demand for these frozen products in the civilian market.

Since frozen foods will compete for the consumer's dollar largely with fresh fruits and vegetables, it is of significant interest that the largest proportion of fruits and vegetables consumed by the civilian population is in the fresh state. As such, this will offer frozen fruits and vegetables an unusual opportunity to increase per capita consumption because of their freshness, eye appeal, quality in flavor and texture, ease of preparation for eating, lack of waste and, in addition, their price.

On the basis of per capita consumption, some of the competitive influences that will be encountered by frozen fruits and vegetables with fresh and canned products can be partially evaluated (Table I). Using the big five vegetables as examples, a comparison shows that the consumption of fresh lima and snap beans, corn and spinach exceeds, by far, that of these same vegetables canned or frozen. But consumption of canned peas exceeded that of the fresh vegetable by nearly 2 lb. in 1943 and 0.34 lb. in 1944. Obviously, frozen peas will encounter a dual competition, from both fresh and canned peas, in postwar markets. And because of their year around availability, it is quite possible that some other frozen foods will compete with canned foods.

Variation by Region

Markets are composed of people with dollars to spend, and it is reasonable to expect that the sale of frozen foods will increase most appreciably in the larger markets. However, the peculiarities of consumer food preference and tastes have the effect of dividing the nation into individual regions—some where sales of certain foods are good, and others where sales are negligible. From this viewpoint, it is possible that per capita consumption of frozen foods by regions might resemble that of canned foods (Table II).

Such a comparison must consider, of course, that canned foods have not been restricted to certain classes of buyers, as frozen foods have been in the past. Also, it must be remembered that a relatively large sales volume can be expected in heavily populated markets, even though per capita consumption is not large.

For many years, the larger canned food companies have covered the nation with advertising for their products, and historical records show a continuing increase in per capita consumption of canned fruits and vegetables. However, current sales resistance cannot be compared to that of the past, for today's markets are controlled by the "sellers." In this respect, frozen food packers are in the position of being able to choose their most favorable markets and, through advertising and merchandising, establish a consumer demand for their brand of foods.

If the industry, in all its branches, is to expand and increase output in a manner similar to that shown as a possibility for frozen fruits and vegetables, it is evident that careful consideration must be given to refrigerated storage and distributional facilities with which to handle this production. The magnitude of such a study required individual presentation, and such an article is planned for a future issue of FOOD INDUSTRIES.

The factual matter upon which this study is founded is the most accurate now available for publication. It is clear that data are limited, but the historical records, when projected graphically into the future in a conservative manner do seem to indicate a healthy growth in store for the frozen food industry. This article is not prepared as a prediction or prophecy of the magnitude to which the industry may expand in the future. It is offered as a basis for study and individual interpretation, with such interpretive comments and graphic presentation as might be helpful in throwing new light on a much discussed subject.

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Remedies for Slippery Floors*

Falls constitute about 10 percent of all serious injuries. Which points up the importance of sure footing in accident prevention

By HARRY E. GAVEY, Swift & Co., Chicago, Ill.

NONSKID paving brick has been improved to a point where it is accepted by industry as the best nonslip floor covering for general use. If a department has a floor of the old style brick that is subjected to grease, hot water and rough usage, the bricks wear hollow in places, causing a slipping hazard. When these old floors are replaced with the new nonskid brick and subjected to the same treatment, i.e., water and grease, there is a noticeable improvement in the gripping qualities. It gives the employee a sense of security; he can walk across the floor with confidence.

This nonskid brick has an intermix of iron ore which is fused during the baking process, providing iron particles throughout the entire body of the brick. Regardless of how deeply the brick becomes worn, the nonslip quality remains.

Concrete floors are satisfactory in departments where they are kept dry and free of fats, grease and hot water. A good slip-proof surface can be obtained by troweling into the cement finish carborundum or aloxite chips. The only unsatisfactory aspect in this floor finish is that when it disintegrates or wears to a point below the finish, where the abrasive chips no longer are present, the nonslip quality no longer exists. The cost of a floor of this kind is high, but careful planning of walkways will keep down the total expense.

Abrasive-ingrained vitreous tile is recommended in the U. S. Department of Labor Pamphlet, "Slaughtering and Meat Packing, The Control of Accidents." The following is quoted from that publication:

"Floors in sections which require frequent flushing or washing can be made of various materials, but a vitreous tile with some abrasive ingrained has been found to be most practical from both safety and durability angles. Some of the larger companies in this industry now use only such tile. A hard tile, preferably with a vertical grain, stands up well under hard usage, does not become too slippery for safety under average circumstances, allows practically no absorption, and has the approval of the Department of Agriculture. Too, this type of tile can be used in resurfacing worn floors at less expense, usually, than the normal cost of new floors, and the expense of cleaning, drying, or nonslip compounds is obviated."

Some relief from the slipping hazard in food plants can be attained by one of the following steps.

1. Sprinkle loose salt on clean floors.
2. Apply strips of metal safety plates on approaches to scales, doorways and docks.
3. Cover portions of the floor in areas where traffic is the heaviest; i.e., aisles or walkways, with slate-coated or mineral coated roofing paper. This has been found to be very effective in preventing slips and falls. However, if subjected to rough usage and hot water, it soon disintegrates and has to be replaced. Applying the proverb, "The cost of accidents is always greater than the cost of prevention," it would seem to be good business to replace it as often as the occasion requires. Abrasive floor paints are being developed which may overcome these objections.

Industrial asphalt planking has proved to be very satisfactory in warehouses, docks, runways and ramps.

The answer to the problem of accidents is attention to housekeeping, the condition of the floor, the cleanliness of the floor, and antislipperiness incorporated into the floor to suit the condition.

The foreman can aid this cause materially by instructing employees in the safe ways of performing each operation, by teaching them to observe all work areas, walkways and ramps, and be guided by directional signs, aisle markings and other reminders to avoid slips and falls. He can instruct employees in the importance of walking correctly and being constantly on the alert. Slips and falls constitute about 10 percent of all serious injuries.

Color is used to advantage in marking hazardous locations.

A clean floor is usually a safe floor, and regardless of the type of flooring used, it is good business to keep it clean and in good repair.

Food plant worker slips as foot strikes piece of fat on floor. Slippery floors are a serious hazard in the food industry.

*From a paper presented before the National Safety Council.

EDITORIALS

LAURENCE V. BURTON, Editor

Businesses for Sale?

AN oddity of the times is the state of mind of the owners of many food businesses. A promoter discovered a few months ago that about half of all the food companies he queried were willing to sell out. This did not register as very important until recently, when Walter W. Weissmann, of Aetna Industrial Corp., discovered that 126 owners of 920 firms in some unstated line of business were considering selling out. The problems of complying with excessive regulations and the well-nigh impossibility of retaining any profits is given as the reason for the despondent attitude.

This is not a healthy condition. Let those who want to equalize everything and all incomes buy up some of these businesses and try to keep them going. They may discover that there are not enough capable managers to go around.

"Soya Butter" Caught Between Two Laws

A BUTTER substitute made exclusively of soybeans and vegetable materials has been developed in Michigan under the name Soya Butter. Difficulty has been experienced by the promoters in completely meeting both the oleomargarine tax law and the regulations and standards of the Food, Drug and Cosmetic Act. This experience is of some general significance because it illustrates the complications of any product development under certain circumstances.

The new product is a vegetable butter substitute which its backers claim should not be taxed under the oleomargarine act. But that law is purposely very broadly worded so that materials like normal oleomargarine will be subject to the same tax responsibility. The new company is undertaking in the Federal courts to restrain the Internal Revenue Bureau from applying the tax to this all-vegetable product.

Whether the new product is taxed or not, it must comply with food regulations of the Food and Drug Administration. That agency has established standards for margarine which would specifically preclude calling this new product by that name. And the standards under this act are by the law itself to prevail over any other laws insofar as they affect wholesomeness, quality, standards or labeling in the public interest. The question then becomes one of determining how such new food can be labeled.

F & DA indicates the willingness to consider an amendment to the margarine standard to provide suitable recognition and definition for such new product if the facts so justify. The promoters of the new product must come in and ask for a hearing. If granted, they must then make a persuasive record that their product should be recognized in the public interest. Up to the end of January the promoters of this new product had apparently not undertaken this responsibility. Officials seem to feel that the manufacturers of a new product closely resembling the standardized product must accept that responsibility if the new product is going to be marketed in interstate commerce.

Dirty Plants

IT was odd to hear representatives of the government remonstrating with the pickle packers of the country about the dirty conditions of some few plants. Evidently there are still a few bad actors in the field. It was odd to hear remonstrance, because it has always been the experience in the past to see the offender smacked down, hauled into court or stuck into the jug.

In the current instance, the government officials were procurement officials, not Food and Drug inspection officials. If it were the latter, there would have been a warning (perhaps) and then prosecution.

Re "Full Employment"

WORTHY of a placard in every factory and office of the land is the following quotation from the January, 1945, monthly statement of economic conditions put out by National City Bank of New York.

"The responsibility for employment is a responsibility of everyone—of labor not to price itself out of jobs and to give full work for full pay, of employers to conduct their business with vision and enterprise, seeking to serve the people by making more and better goods at lower costs, and of the Government—not to 'make work'—but to provide the environment under which investment can go forward and enterprise function."

Quicker Detection Of Deterioration

THE spectrofluorometer is beginning to be recognized as an important instrument in quality control, especially where studies are being made to determine what deteriorative changes are going on in storage. Fluorometric measurements often reveal changes in composition long before they can be detected by taste, smell or appearance. Where the so-called Maillard reaction is a factor in quality deterioration, the fluorescence of the end-products of the reaction in ultraviolet light is easily traced.

The Maillard reaction, one of the most difficult problems of quality control today, apparently is a chemical combination between sugars and amino acids, both of which are normally present in foods, and an important cause of darkening. Darkening of dehydrated vegetables

that was formerly thought to be due to scorching or overheating seems to be due to the Maillard reaction, and the slow yellowing or browning of dehydrated potatoes in storage also is caused by it. Though the problem is very important in the vegetable dehydration industry at the present time, it is rather wide spread throughout the food industry.

Fluorometric measurements offer an excellent way to detect it in its early stages and study its progress. These measurements, however, require scientific training, and it is doubtful if an untrained person will obtain satisfactory results.

Using Graduate Chemists For Tough Jobs

WE are glad to be able to report that at least one food company makes a conscious effort to keep its college-trained chemists off of routine analytical jobs that bore and discourage them. Most routine analyses can be set up in such a way that any intelligent youth can perform the repetitive functions and turn in acceptable results. If a high school graduate can do this sort of laboratory work, there is no profit in making a university-trained man do the same job. Furthermore, not only is it wasteful of money and manpower to use the more highly trained man for routine work, but it is likely to set him looking for a new job in a very few months when he becomes fed up with it.

A man or woman who has passed a university course in chemistry is trained for handling the unusual, not the repetitive job. It is often a mystery why some firms will insist that bench chemists be college trained, yet would never think of making a machinist out of a man who was trained in mechanical engineering. There are usually plenty of unsolved difficult jobs around most plants to justify better utilization of trained and skilled manpower than on jobs a youngster can and should do.

Give Controllers A Fair Chance

DON'T make automatic controllers do any more work than necessary. That should be the first principle in control application in all food processes. Let us elaborate on this a little.

Any controller is an "ironer outer" of variables. And the fewer and the smaller the variables, the less ironing out the controller will have to do and the smoother the job—also the better the process.

How do you minimize the variables? Well, let us get down to a concrete example. Suppose you are pasteurizing a liquid food in a continuous heat exchanger, using hot water as the heating medium. The product temperature will be controlled by an automatically operated valve which regulates the flow of hot water. Now, if the temperature of the water is uniform, one variable is eliminated and control is more uniform. So you put a separate controller on the water. But the pressure of the steam which heats the water is subject to variation, so you can further improve control by having a regulator on the steam supply.

More controllers, however, are not always necessary to reduce the magnitude and frequency of the process variable which the final controller must iron out. Sometimes a little adjustment in the process ahead of the controller will do the trick. Assume, to get down to something specific, that you are lye-peeling potatoes and you are controlling the temperature of the lye solution. If potatoes feed into the peeler at a capacity rate for a while, the controller gets "set" to carry that load. Then if the flow of potatoes slows suddenly, the reduction in heat requirements is so sharp that the temperature of the lye solution may "overshoot." And if the potatoes suddenly start coming at full rate again, the increase in heat demand will be so sharp that the temperature in the peeler will be too low. By arranging operations ahead of the peeler so that the flow of potatoes is regular, the controller will not be required to do so much and it will do a better job.

The use of an extra controller or the cost of regulating the process ahead of the controller is not always added expense. Simpler controllers and less costly ones often will suffice where they are not asked to do so much. But, more expense or not, better control will mean more uniform quality, which will mean more business in the years of keen postwar competition that are just around the end of the Siegfried line.

Butter Rationing Vagaries

ONE of the most difficult things to explain to an Australian or a New Zealander is just how much butter is allowed in the United States butter ration. It is impossible to explain because there is no definite quantity. In the United States we are given a book of red stamps that can be used for a variety of purposes. With these we can purchase fresh meats, cured meats, butter, margarine, cheese, canned milk and canned fish. At the moment the stamps are good for 10 points each. We can use them all for butter (if we can get it) or all for meat, or divide it up any way we choose.

In Australia, on the other hand, the citizen is issued a book of stamps each of which has a specific use, and there is a stamp for each item for each week: sugar, tea, meat, butter. Normally, the Aussie eats twice as much butter as we, 31 lb. per capita *vs.* our 17 lb. Under his system, the value of the stamp for a rationed commodity can be varied by the Controller-General of Food, depending on how much of the commodity is available. But under no circumstances can the meat stamp be used for butter, or vice versa.

When the Aussie hears of our butter shortage, he asks how much we are supposed to get, and cannot get a satisfactory answer. It is doubtful if Chester Bowles himself has the vaguest notion of what a person is really entitled to.

Letters to the Editor

Storage of Chocolate

To the Editor
of FOOD INDUSTRIES

In the Question and Answer Section of the October issue, the statement is made that storage temperatures of 67 to 69 deg. F. should be avoided in storing chocolate bars, because that seems to be the critical range for the crystallization of cocoa butter, and a grainy mass results from storage in this range. The item advocated storage at 71 to 75 deg. F. if it is impossible to store at 60 to 65 deg. F. Reference was also made to maintaining a relative humidity of 75 percent (presumably at 60 to 65 deg. F.).

It would be interesting to have the experimental data on which these statements are made. One wonders if the chocolate were properly tempered and molded, because many things may happen otherwise. If the chocolate were properly made and if the temperatures were rigidly controlled within the limits of 67 to 69 deg. F., how long did it take for graining to take place? Was the chocolate protected against direct sunlight? Were the chocolate and conditions comparable in the storage at 71 to 75 deg. F.?

It is somewhat difficult to hold storage rooms at a constant temperature, desirable as it may be. Probably 65 deg. F. is a good temperature at which to aim. 60 deg. F. would be too cold for shipment under atmospheric conditions in hot, humid weather. There are conditions, in many parts of the country, when 65 deg. F. would be too low.

With your danger sign out for 67 to 69 deg. F., it is possible that some of your readers might go to unnecessary trouble, if the statements are not correct at least over a reasonable period. We have had chocolate stored in warehouses in which the temperature varied from 65 to 70 deg. F., and in some cases went considerably higher, with no evidence of graining. In some of these, it is quite probable that the chocolate was held for some time in what you have designated as a dangerous range.

The statements as to humidity are somewhat conflicting. It is quite correct that humidity has no effect on chocolate in storage unless it reaches the dew point for the temperature of the chocolate at the time. There is no reason that we know for maintaining a relative humidity of 75 percent.

In the winter the relative humidity in many warehouses drops very low, and as the outside temperature is lower than the storage temperatures no harm can result. It would be very difficult to maintain 75 percent humidity in many warehouses because of condensation on outside walls.

The only danger from humidity is the "sweating" of the chocolate if taken into atmospheric conditions under which the dew-point is above the temperature of the chocolate coming out of storage. It is not clear to me wherein the relative humidity in the storage has any significance at all, unless it is too high for the temperature of the chocolate. This could happen if the storeroom doors were left open on a very hot day of high atmospheric humidity.

It seems to me that your answer to the question, insofar as it refers to chocolate coating or chocolate bars, calls for unnecessary conditions which are not readily attained. None of my remarks applies to nutmeats or candy.—R. F. KORFHAGE, *chief chemist, Peter Cailler Kohler Swiss Chocolates Co., Inc.*

The Answer

Reference to the relative humidity in storage areas for chocolate storage was misleading in that the statement should have read "maintain a relative humidity not to exceed approximately 75 percent." The implication of the statements made concerning relative humidity was to impress upon the inquirer the fact that the dew point for the storage temperature used should be avoided. Obviously, lower relative humidities would not be objectionable because there would be no danger of moisture deposition on the chocolate.

The basis for the statements about avoiding storage temperatures of 67 to 69 deg. F. for chocolate is personal experience. That experience was concurred in by contemporaries engaged in chocolate and candy manufacture at the time we experienced the difficulty several years ago.

The point raised with respect to whether or not the chocolate was properly tempered very likely may be pertinent. The tempering procedure followed was that commonly used throughout the chocolate and candy making industry at the time. There was plenty of opportunity for errors in the human equation as well as in the thermometers used, although the operators were carefully trained and experienced and the thermometers were systematically checked against a certified standard for accuracy of calibration and temperature indication. However, there are so many factors which enter into chocolate tempering that there is the possibility that the tempering technic was faulty. This fine crystal formation or "powdering" is not to be confused with "fish-egging" and "streaking," which are the result of casting at too high a temperature or of too slow cooling.

However, storage of test samples at temperatures of 60 to 65 deg. F. and 71 to 75 deg. F. did not show the deterioration over a period of four to six months that the samples from the same chocolate coatings (bitter of more than 50 percent and medium and dark sweet of 38 and 40 percent, total fat, respectively) showed when stored at 67 to 69 deg. F, with other conditions being as nearly identical as we could get in inside storage rooms. In no case were the coatings exposed to direct sunlight or other sources of light which would give off appreciable amounts of ultraviolet rays, if any. In fact, the small 8-oz. test samples were wrapped in tin foil and the 10-lb. cakes were double wrapped in kraft paper.

The test runs were made to determine what might have caused powdering of several thousand pounds of coatings made in late spring months, cast in 10-lb. cakes, double wrapped in kraft paper, packed in cocoa bean bags and stored during summer months for sale or company use during the autumn rush season. The "powder" appeared to be substatially low in fat.

When heated to 110 to 120 deg. F., the coatings regained their normal properties, tempered normally and worked normally for hand dipping and machine work.

In contrast, "odds and ends" of chocolate liquor, cocoa butter and medium and dark sweet coatings cleaned out of a Midwest commercial storage warehouse and returned to the factory for salvage and reworking showed no indication of powdering although some of

(*Turn to page* 176)

Instrument Air *must be* CLEAN AIR!

Remember! Only a Nash Compressor can supply Clean Air!

Because Nash Compressors have no internal lubrication and because delivered air is thoroughly washed within the pump, the Nash delivers only clean air, free from dust, heat, or oil. Therefore, instrument air supplied by a Nash assures immediate instrument response and eliminates all troubles resulting from fouled instrument lines, gummed orifices, and rotting instrument diaphragms. Also avoided are trouble and expense of the usual oil filters, dust filters, and after coolers, as none are used. Nash means dependable, low cost instrument operation.

Nash Compressors produce 75 lbs. pressure in a single stage, capacities to 6 million cubic feet a day in a single structure. No valves, gears, pistons, sliding vanes, or other enemies of long life complicate a Nash. Original capacity is maintained throughout a long life. Investigate the Nash Compressor now.

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NEW PACKAGES & PRODUCTS

U. S. Army Signal Corps

Army Rashers

BOIL in water for 3 minutes, remove, drain and fry. That's all there is to preparing the sliced bacon of the Army's 10-in-1 ration, now going out to the men in combat zones behind the front. The Army itself developed this meat treat, and is proud of it.

Dry salt-cured bacon, evenly lean and fat, with rind removed, is sliced 7/64 to 8/64 in. thick, then the slices are placed together and firmly molded to give a minimum of exposed surface. Blocks are wrapped and placed in 7½-lb. "Pullman" cans which are sealed under vacuum.

The flavor is comparable to the commercial product, and without refrigeration the canned bacon is known to have remained in good condition for as long as two years.

Apples for Breakfast

QUICK-COOKING farina is combined with dehydrated apples, sugar, salt and spices in a breakfast cereal made by Dry-Pack Corp., New York.

Apple-Tot is finely granulated and cooks in 5 minutes, in just the same way as the plain cereals. It is packed for test-market distribution in a waxed bag enclosed in a yellow folding carton bearing a natural color picture of a girl eating a large bowl of the product.

Flying Energy

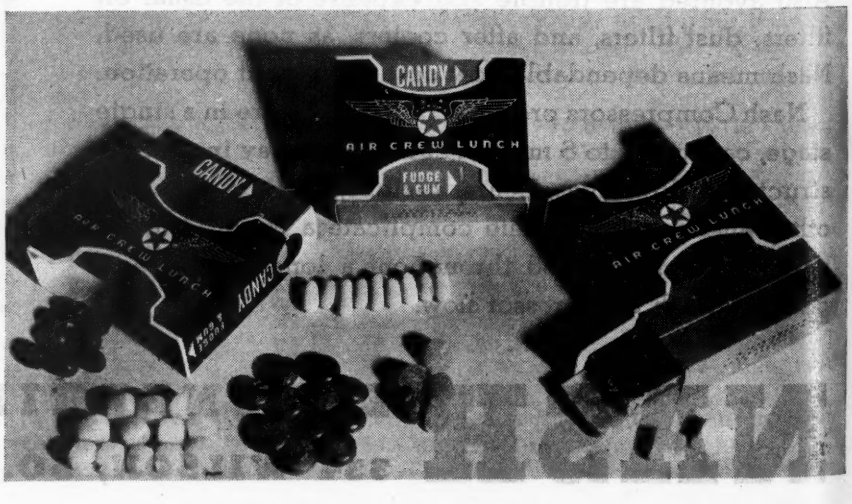
NUTRITION FOUNDATION, New York, and the Physiology Department of Northwestern University helped determine what should be in the newly developed Air Crew lunch package. The Subsistence Research and Development Laboratory at the Chicago Quartermaster Depot made sure that what goes into the package will come out. The result is 480 calories of quick energy, with variety in flavor and texture, packed so that a flyer can feed himself without removing his heavy flying mittens.

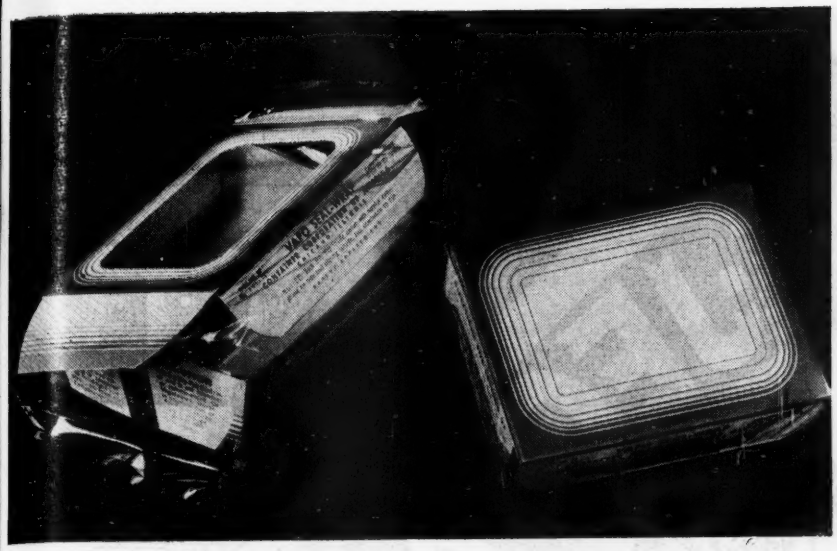
Items include chocolate and vanilla fudge, gum drops, four flavors of fondant cream, chocolate drops, licorice drops, chocolate-coated peanuts and sugar-coated peppermint-flavored gum. The sugar coating on the gum is in itself of packaging interest, since it prevents flavor transference to the other items and preserves freshness. Selection was made on the basis of preference by the men who use the ration, which is issued to all combat flyers on missions of three hours or more.

The box-and-sleeve container has two compartments. When the sleeve is pushed one way, the small candies come out, one at a time, for direct box-to-mouth eating. When the sleeve is pushed the other way, the fudge and gum are available. The unit is bright and cheery in color, being printed in red, white and blue, with AAF insignia.

For shipping, 80 units are packed in a sealed tin can, protected by a wooden case. Thus packed, the ration will keep for years without deteriorating. It can withstand 160 deg. above or 65 deg. below zero, and up to 90 percent humidity.

U. S. Army Signal Corps





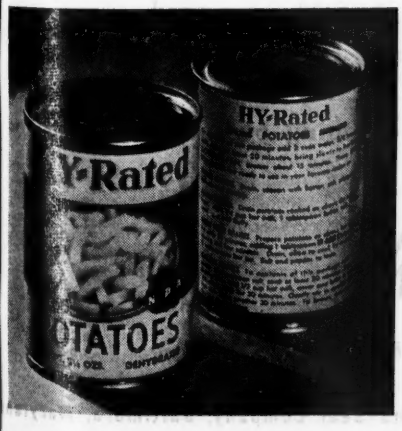
Easy to Pack

DESIGNED for frozen foods, a top-opening, folding, waxed-paperboard carton with a firmly attached heat-sealing cellophane overwrap is made in four standard sizes, suitable for disjointed chickens of 1½ to 4 lb. dressed weight. The carton is adapted to a wide variety of items, such as ground and boned meats, cuts and chops, liver, sweetbreads, fish, dry packed vegetables and fruits, dehydrated foods and even prepared cake or biscuit dough.

Container Corp. of America, which designed the Vapo-Seal-Wrap package, supplies it with a simple design printed in blue against a white background.

Test Packages

DEHYDRATED vegetables for the consumer acceptance test conducted by the National Dehydrators Association are packed in small cans, each holding four servings. On the dry basis, this ranges from 2¼ oz. for carrots to 4 oz. for sweet potatoes. The other vegetables are beets, onion flakes, julienne and diced potatoes, all offered under the Hy-Rated mark.



Bright colors have been chosen for the lithographed labels, yellow and blue predominating, with red for accent. A full-color picture of the vegetable, either before processing or after reconstitution, appears as part of each design, with the seal of the NDA.

As should be done with any new product, clear directions for preparation and use have been given a prominent place on the labels.

Mix to Freeze

ICE CREAM continues to receive the attention of the mix makers. 'Tis Ready Mix, made for Homix Products, Inc., New York, contains dried cream, milk, sugar, sodium citrate, vegetable stabilizers, vanilla, vanil-

lin and U. S. certified color, with or without cocoa. With a cup of cold water added, the mix is ready for the freezing tray.

The 5-oz. net weight package is sufficient for six servings. A waxed paper bag is used, in a folding carton printed in blue and orange on white.

A green tint panel on the sides and top serves as a background for the instructions for mixing and freezing.

Take the $ $ $ $ $ $ $ out of $tone$

• Now, with critical war shortage of labor, streamline STONING in your mill. Removing stones has always been slow, laborious and costly out of proportion to other steps in processing cereals, soy beans, and other dry foods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic metals, and all other hard, dangerous contaminations from cereals, soybeans, and other beans, and other food products with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour. *Write for Bulletin FI-345.*

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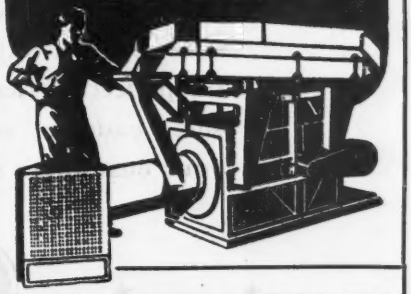

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In Canada—Kip Kelly, Ltd., 68 Higgins Ave., Winnipeg
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E-JECT-O, drain opener manufactured by the United Gilsonite Laboratories, Scranton, Pa., has a terrific attraction for moisture, yet economy demands it be packaged in unsoldered cans. So, it is packaged in Crown cans — because, after repeated tests, Crown lap-seamed cans outperformed the field . . . proved the perfect barrier against dampness. Thus, E-ject-o retains its potency, assures customer satisfaction. Making cans that mean satisfaction to you, to your customers and *their* customers is Crown's way of doing business.

★ ★ **CROWN CAN** ★ ★

INDEPENDENT AND HELPFUL

CROWN CAN COMPANY • NEW YORK • PHILADELPHIA • Division of Crown Cork and Seal Company, Baltimore, Maryland

FOOD INDUSTRY NEWS

THE PROCESSING PICTURE

Plans and Problems Discussed at Dehydrators' Limited Convention

Government agencies report their needs for the coming year, while operators are told some research results

By restricting the number of delegates to a figure under 50, the Office of Defense Transportation limit for a convention without a special permit, the National Dehydrators Association held its 1945 convention at the Sherman Hotel, Chicago, February 6. Lt.-Col. Cecil G. Dunn, of the Office of the Quartermaster General, announced the Army-Navy requirements for the year beginning July 1, and requirements for the same period by the War Food Administration were announced by Wayne J. Chastain (see article on page 79).

Lt.-Col. Dunn emphasized that dehydrators should not go after government business, stating that the procurement officers will solicit the business from acceptable manufacturers in plenty of time for making all the necessary arrangements. Reviewing technical procedures that need improvement, he said that the QMC may later specify still lower moisture content. He also discussed sanitation, sulphiting, and peeling losses and predicted that the Army will continue to use large quantities of dehydrated vegetables even after the defeat of Germany.

Lime Packing

Dr. Louis B. Howard told the convention about a new method of attaining very low moisture content vegetables developed by research at the Western Regional Research Laboratory. This is attained by inserting into the shipping container a smaller container of moisture-permeable material containing freshly burned calcium oxide that will absorb nearly one-third its weight of moisture. The method termed "lime packing," sacrifices 21 percent of the space in a 5-gal. container of diced white potatoes, 14 percent for diced carrots, and 7 percent for cabbage. But it prolongs the edible storage life of the products to a degree that seems to make it a desirable method of getting rid of the last of the removable moisture. It seems to hold considerable promise because of the extremely low rate of moisture loss, a matter of many weeks, at the final stage of drying.

W. B. Van Arsdel, also of WRRL, described development work now under way to peel onions by a steam blast after the two ends have been suitably cut. The estimated operating cost is about 30 cents per ton of onions peeled.

The plans for the Grand Rapids sales test of dehydrated vegetables were further developed. Members of the association indicated clearly that every possible effort would be made to keep the industry going by selling to the civilian market after the war demand ends.

New officers for the coming year are: President, George E. Clausen, president, C. B. Gentry Co., Gilroy, Calif.; vice-president, J. H. Hume, president, Basic Vegetable Products Co., Vacaville, Calif.; executive secretary, Graham Adams (re-elected).

Soft Drink Award for Best Industry Research

A CASH prize of $1,000 and a certificate will be awarded by the American Bottlers of Carbonated Beverages to the individual who, in the opinion of the association's committee of awards, has made the most outstanding scientific or technical contribution to the progress and advancement of the soft drink industry during the year 1945. The ABCB is the national association of the bottled soft drink industry.

To be known as the Chesterman Award, the prize will be given in honor of C. B. Chesterman, soft drink manufacturer of Sioux City, Iowa, and a former president of the association. Mr. Chesterman was for several years chairman of the association's research fellowship committee, and was the sponsor of research work conducted by the American Bottlers of Carbonated Beverages at Iowa State College from 1923 until World War II.

Wide World

THE ARMY SALVAGES TIN

Here is what the Army is doing about the tin salvage program, at least at Fort McClellan, Ala., where this picture was taken. This was the third freight car in one month to be loaded and shipped to a detinning depot in Birmingham.

The Chesterman Award will be open to post-graduate students, college technical men and independent research workers, as well as to technical men in the soft drink and related industries.

The rules governing the Chesterman Award provide that no limitation is placed upon the nature or form of such scientific or technical contribution. The reported results of scientific research shall be included.

Quartermaster Lab Holds Research Conference

A FOUR-DAY conference of research workers was held in Chicago, January 31 to February 3, at the call of the Quartermaster Subsistence Research and Development Laboratory, to pool their latest knowledge about the problems connected with the dehydration of vegetables. Admission, by invitation only, was limited to those who were performing research under contract with the QMC Laboratory, and to special technical advisers and Allied workers in the same field. The industry had one technical observer present.

The conference was a research symposium where each of the contract researchers was brought up to date on what the others had discovered in their assigned fragments of the whole problem of vegetable dehydration. Many of discussions were centered around the understanding and control of the troublesome Maillard Reaction between amino acids and sugars. Forty formal scientific papers were presented, supplemented by several informal symposia.

Macaroni Standards Raise New Issues

THE National Macaroni Manufacturers Association did not complete their presentation of a request for a new definition and standard of identity for enriched macaroni, enriched spaghetti, and other related products at the first hearing which began January 29. A full week was used and then a recess was taken to February 26. On renewal of the hearings the industry expected to prove further the necessity for these standards.

The Food and Drug Administration is not opposing such definitions but is requiring the industry to make a record demonstrating the necessity for definitions for such products. As one observer put it, "We shall soon have no natural foods left, if everybody enriches their products." This reflected the real issue; whether there is a need or a proper dietary place for enriched alimentary pastes. Presumably the industry must make a persuasive showing on this point or no supplement to the present standard for unenriched products will be granted.

It is freely admitted at F&DA headquarters that industries seeking definitions or standards for products containing added vitamins or minerals must show the need in the future as one of the bases for new standards.

Use of Pear Wastes As Yeast Food Sought

A CHEMICAL research project on pear cannery wastes, to make possible the use of such wastes in the production of yeast feeds or foods, was described at a meeting of the Washington State Horticultural Association in Yakima, recently.

The object of the research is to enable pear canneries to collect all waste, add certain factors, and then allow live yeast cells to grow on the prepared medium and convert it into a yeast feed or food. It has been found that the yeast commonly known as Torula yields a product on modified pear waste that is comparable to the well-known brewers' yeast in B vitamin and protein content. Yields are approximately equivalent to half the amount of sugar in the pear waste. For example, waste that contains 7½ percent of sugar would yield about 75 lb. of dry yeast per ton of waste, according to these preliminary tests.

This research project is being conducted in the Western Regional Research Laboratory in Albany, Calif., by H. D. Lightbody, I. C. Feustel, and co-workers. A canning company in Olympia, Wash., has collaborated in some of the experimental work.

DEVELOPMENTS IN DISTRIBUTION

Freezer Space Shows Signs of Improvement

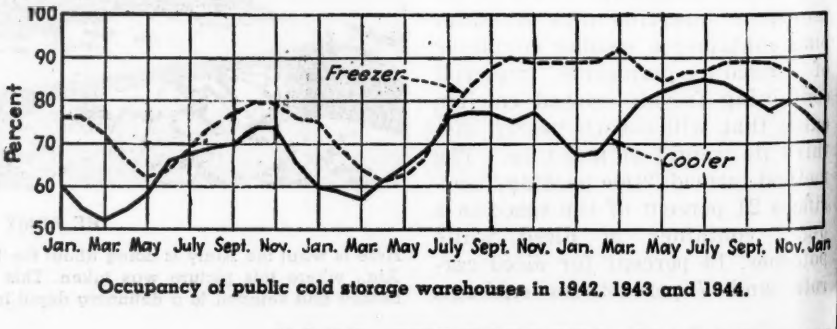
THE condition of freezer space occupancy is much better this year than last. The reasons are that less frozen meat was in storage on February 1 and the prospects for later in the year are that less will be in storage. Frozen fruits and vegetables are moving out of storage in a more normal manner this year than last. Butter stocks also are lower at the present time.

Artificial stopping of the flow of food into the channels of consumption have brought the cold storage industry to grief in years past. This year the situation has changed. Shipping conditions on the high seas are much better than at the beginning of the war. The establishment of ration point values on a more rational and realistic basis is having its effect on the movement of frozen foods out of the warehouses. Generally speaking, the official action of bureaucrats which have been responsible for gluts in the past have now been eliminated.

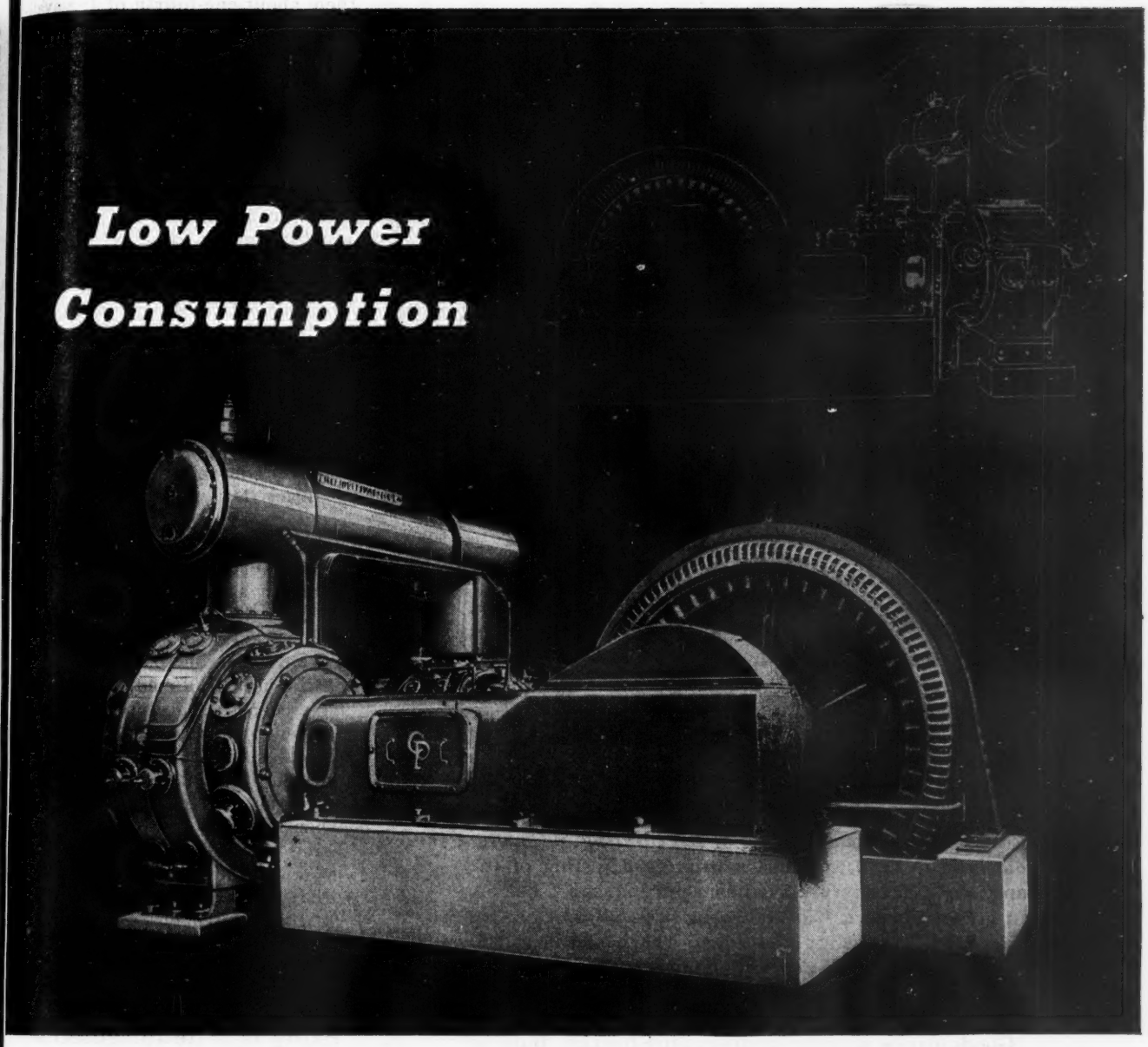
Over the period shown on the chart a great amount of new warehouse space has been built, approximately 51,000,000 cu. ft. since 1941.

By the first of March or soon after, new plants at Portland and at Nashville, each of 1½ million cubic feet capacity, will be in operation. These plants can be used as all freezer or all cooler space as required. Other facilities have been put in service since the last peak, which will help the future situation. These include Army plants at Seattle, Auburn and San Francisco. On the other side of the picture, requirements of frozen meat for overseas shipment are expected to increase. This means a considerably greater demand for freezer space.

The present ceiling on the use of freezer space for the storage of frozen fruits and vegetables gives



Occupancy of public cold storage warehouses in 1942, 1943 and 1944.



BUILT INTO CP CLASS O-CE COMPRESSOR

THE low power consumption of the heavy-duty Chicago Pneumatic Class O-CE Compressor is the result of large area, durable, quick-acting Simplate valves . . . streamlined air passages . . . multi-step capacity regulation . . . thoroughly effective intercooling and water jacketing and efficient lubrication.

CP Class O-CE Compressor is of the horizontal, double-acting, water-cooled type with direct-mounted synchronous motor drive. Capacities range from 350 c.f.m. to 10,000 c.f.m., 80 pounds to 125 pounds pressure. Other sizes available for lower and higher pressures and for other types of drive. Write for Bulletin 726.

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The most widely used Wrapping Machine in the Packaging Field

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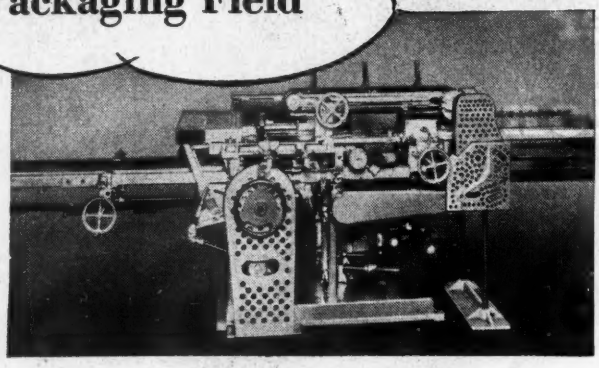


The ideal machine for wrapping

FROZEN FOODS

Frozen food packers, like so many others in the package goods field, are turning to our fast, quickly adjustable FA machine. And with good reason!

Here's a machine that can produce 70 *faultlessly wrapped* packages per minute . . . Its superior electric-eye mechanism *assures accurate location of the printing, no matter how long the run;* no time-consuming adjusting of the paper feed is necessary, once the machine is set . . . The FA can accommodate a wide range of sizes, all adjustments being quickly made by a single hand-wheel. And a new roll of wrapping material can be mounted on the machine in less than five minutes. These time-saving features mean a lot—particularly during seasonal rushes.

Goods may be wrapped before or after freezing. Bulging cartons are pressed back into shape in the wrapping process. The wrapper is securely sealed by heat. To assure a perfect seal, the mechanism that *forms* the end-folds is heated, thereby preventing the accumulation of wax.

A *straight-through* machine, the FA occupies a minimum of floor space, and is suited to automatic conveyor feed or hand-feed with the minimum of labor.

All working parts are camless, resulting in quiet operation. Machine is easily cleaned, and exposed parts are specially treated to prevent rust and corrosion.

For a *better-looking* package, as well as fast, low-cost production, get the facts about the FA.

Write for our leaflet on Frozen Food Wrapping

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts

30 Church St., New York 7 • 111 W. Washington St., Chicago 2
101 W. Prospect Ave., Cleveland 15 • 443 S. San Pedro St., Los Angeles 13
32 Front St., W., Toronto 1

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

them about one-fourth of the available space in the country. This is much more than these products required before the war.

Application for quick freeze equipment for starting new firms have been turned down in the immediate past and will be for an indefinite time in the future. The government attitude, in passing on applications, is based on the belief that it is more important to have storage capacity to handle what the present freezer capacity can produce than it is to add freezer capacity that will have no storage space.

The same equipment is used both in freezers and warehouses. The capacity of the equipment manufacturers is relatively small. The quantity left over, after military requirements have been satisfied, is all that is left for private industry. More storage space would mean an easing of the 25 percent limit on the use of space by frozen food packers.

The rigid controls now in effect on the use of all cold storage space have been the subject of much discussion by industry and Washington officials. The future holds great uncertainty. It is believed that after the war there may be a time when demand for food products using cold storage warehouses will go down while production of these products remains high. Under such conditions, it may be desirable and possibly essential to retain some of the controls.

Army Ups Requirements For Canned Foods

IT WILL take about 8,000,000 more cases of canned vegetables this year than last to meet the requirements of the U. S. military and war services. That is the demand picture presented to the planning committee of National Canners Association on February 5 by Lt. Col. Ralph W. Olmstead, vice-president and director of supply, Commodity Credit Corp. The requirements will include nearly 90,000,000 cases of set-aside vegetables (up more than 7,000,000 cases from 1944) and 2,400,000 cases of non-set-aside vegetables (up nearly 1,000,000 cases).

Requirements for non-set-aside fruits and juices are up a few thousand cases over 1944.

Requirements of set-aside canned fruits and juices, other than citrus, total some 33,440,000 cases, while 700,000 cases of non-set-aside

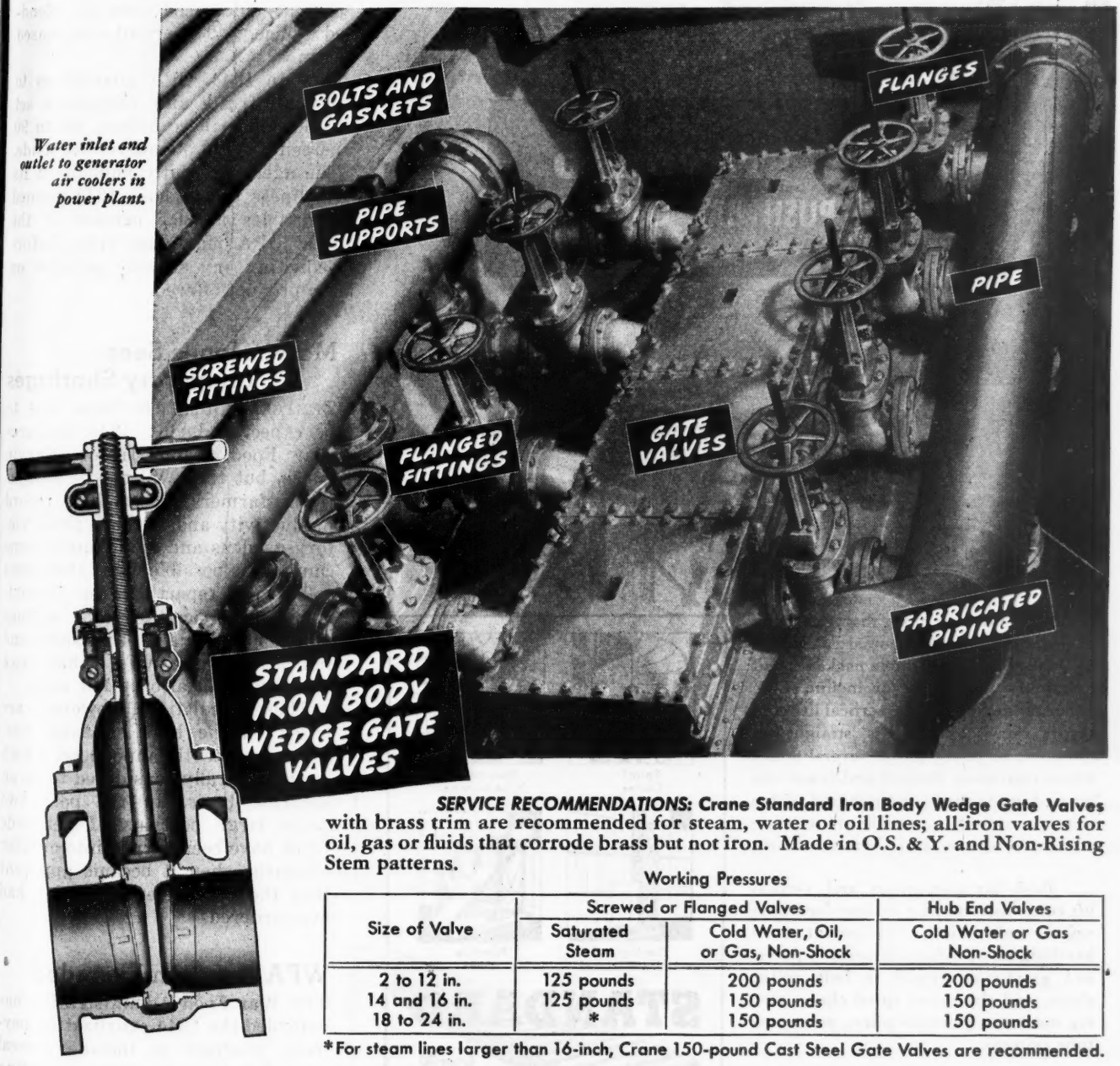
What's Your Piping Materials Problem? ...CRANE Has the Answers!

ONE SOURCE OF SUPPLY

ONE RESPONSIBILITY FOR ALL PARTS

ONE STANDARD OF QUALITY

No matter what your need in piping materials ... your Crane Branch or Wholesaler can meet it. One order covers all requirements at any time. You choose from the world's greatest line of piping materials—in brass, iron and steel. You help assure the best piping installation because all parts are of uniformly high quality—backed by a single responsibility. Not only do you simplify and speed deferred replacement work by using Crane *complete* piping materials service—but you get full benefit of Crane Co.'s 90-year experience in the piping equipment field.



Water inlet and outlet to generator air coolers in power plant.

SERVICE RECOMMENDATIONS: **Crane Standard Iron Body Wedge Gate Valves** with brass trim are recommended for steam, water or oil lines; all-iron valves for oil, gas or fluids that corrode brass but not iron. Made in O.S. & Y. and Non-Rising Stem patterns.

Working Pressures

Size of Valve	Screwed or Flanged Valves		Hub End Valves
	Saturated Steam	Cold Water, Oil, or Gas, Non-Shock	Cold Water or Gas Non-Shock
2 to 12 in.	125 pounds	200 pounds	200 pounds
14 and 16 in.	125 pounds	150 pounds	150 pounds
18 to 24 in.	*	150 pounds	150 pounds

*For steam lines larger than 16-inch, Crane 150-pound Cast Steel Gate Valves are recommended.

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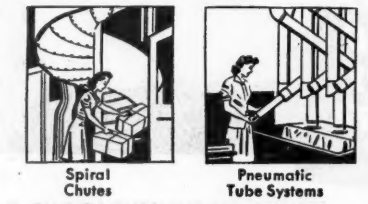
PLUMBING • HEATING • PUMPS

CONVEYORS do more than carry in a horizontal plane. Standard Push-bar Conveyors carry and move packages and containers up a slope or incline at 30, 45, or 60 degree angles; vertical lift conveyors carry commodities straight up and down to the height of several floors. These conveyors that lift and lower can be used individually or combined with a conveyor system to provide uninterrupted flow of commodities between floors.

Push-bar conveyors and vertical lift conveyors are part of Standard Conveyor's wide variety of equipment to cut handling and production costs — power and gravity conveyors in belt, roller, chain, and slat types; spiral chutes, tiering machines, portable pilers, pneumatic tube systems.

Standard Conveyor has been headquarters for conveyors for more than 40 years; we are qualified by long experience to recommend and build efficient equipment for any given installation. Write for catalog FI-35, "Conveyors by Standard" — a profusely illustrated reference book that will prove very useful to you.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fruits and juices will be needed.

WFO 22.9 takes about 48 percent of the estimated total production of canned vegetables, ranging from 107 percent of the carrots down to 18 percent of tomato puree.

The canned fruit order WFO 22.8 calls for about 61 percent of estimated production. These range from 100 percent of berries to 25 percent of sweet cherries.

The requirements for citrus fruits, issued under WFO 22.7 and based on last year's pack are: grapefruit juice, 41 percent—increased from 39; orange juice, 56 percent—increased from 30; blended juice, 49 percent—increased from 32.

As in 1944, OPA guarantees to buy all fruits and vegetables set aside under these orders, up to 90 percent of the quantities set aside. The agency recently announced its readiness to purchase 1944 canned vegetables at 86.5 percent of the total OPA maximum price before deducting any subsidy payable on the product offered.

Marvin Jones Sees Temporary Shortages

TEMPORARY food shortages are to be expected during 1945, declares War Food Arministrator Marvin Jones, but they will not be serious if the farmers repeat their record productivity and civilians plant victory gardens and do as much home canning as possible. This statement followed a report by the Department of Agriculture that serious meat shortages are in prospect and indications by WFA that rice shortages will also be felt soon.

These predictions, however, are based on the high set-aside percentages recently announced, which is not generally considered to be an accurate basis. In the past two years large portions of set-aside foods have been turned into civilian channels when it became apparent that the government agencies had over-ordered.

WFA Program Extended

THE War Food Administration has extended the 1944 equalization payment program to include several canned tomato products, including catsup, paste, puree, sauce, cocktail and tomato juice contained in mixed vegetable juices. As with the other commodities included in the program, the sales period is from March 1, 1944, to April 30, 1945, and is on a processed basis.

Good Advice . .

for all of us . . at times.

But we have never talked even half enough about the satisfaction you will enjoy by specifying

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FOOD PROTECTION PAPERS

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PARCHMENT • KALAMAZOO 99 • MICHIGAN

We can't afford food losses by Spoilage, Leakage or Contamination due to faulty containers . . .
INLAND STEEL CONTAINERS
. . . . are constantly proving their reliability for the safe packaging of foods shipped all over the world.
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5
This seal means that the contents of the container are protected with a baked-on lining tested for the particular product packed.
1. Lever locking ring drum No. 55184
2. Lever locking ring pail No. 514X
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Fiber Container Use Further Cut by WPB

THE War Production Board has further limited fiber shipping containers by amending L-317 as of February 6. The amendment limits the packer of Schedule III products, in which most food items are included, to 95 percent of his lawful 1944 usage, and cancels all appeals granted prior to February 6.

In figuring his quota, however, the packer shall exclude all containers delivered to specified government agencies. If a packer does not use all of his quota in any calendar quarter, he may not use the remainder in any succeeding quarter. Neither may he use in advance any part of his quota for a succeeding quarter.

Poultry Institute Sees New Egg Candling Method

PREDICTION that candling to determine egg quality may be done by radio waves in the near future was made by the newly elected president of the Institute of American Poultry Industries, Dr. Cliff D. Carpenter, at the institute's meeting in Chicago, February 6.

Dr. Carpenter reported that the institute has been a potent factor in securing needed quantities of poultry for the armed forces. WFO, 125, freezing all canned and eviscerated poultry, calls for 70,000,000 lb. of canned chicken and turkey. To fill this need 200,000,000 to 250,000,000 lb. of New York style dressed chicken and turkey will be required.

Besides Dr. Carpenter as president, the following were elected: 1st vice-president, J. F. Peterson, Wadena, Minn.; 2nd vice-president, H. W. Davidson, Fort Wayne, Ind.; secretary, E. B. Heaton, Chicago, and treasurer, W. F. Priebe, Jr. W. W. Dayton, vice-president of the Fairmont Creamery Co., Omaha, was elected chairman of the board.

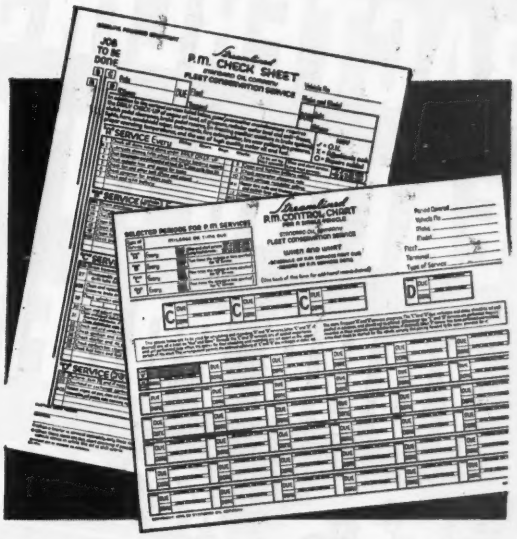
Egg Price Support Announced by WFA

THE War Food Administration's 1945 Egg Price Support Program will include purchase of dried and shell eggs to supply export out-lets and purchase of shell or frozen eggs for direct price support.

WFA's purchase program for dried eggs will operate on the basis of payment for the cost of shell eggs plus a conversion charge. Frozen eggs will be purchased,

A new streamlined P. M. plan

that will work with today's equipment and manpower shortages



One form— a P. M. Check Sheet—for maintenance men to use and a Control Chart for each truck are all that is needed with Streamlined P. M.

1. Eliminates many forms usually required for record keeping.

2. Fits any type of fleet—bus, passenger car, or truck—on delivery or over-the-road operation—including trailer units.

3. Takes less time of skilled mechanics—only 20% of the P. M. work requiring a skilled mechanic.

4. Provides a flexible mileage or time interval for scheduling maintenance work to suit your individual operation.

• WITH little new equipment in sight and the continued manpower shortage, the need for a sound preventive maintenance plan grows daily.

The first objective was to eliminate complicated forms when the Standard Oil Streamlined P. M. Plan was developed. In addition, the Plan was designed to fit any type of fleet operation.

Streamlined P. M. has been tested in a number of fleets, including one of the largest delivery and cross-country operations in the Middle West—our own fleet of passenger cars, delivery, and transport trucks. It has been proved conclusively that the Plan works if it is conscientiously followed. It shortens the time trucks are in the shop. It reduces road failures and cuts maintenance time and costs.

Ask the Standard Oil Representative who calls on you to explain this simplified P. M. Plan. He has a slide film that shows how P. M. works to your advantage. Call the local Standard Oil Company (Indiana) office, or write 910 South Michigan Avenue, Chicago 80, Illinois, for the Representative nearest you.

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ROCCAL is recommended by over one hundred leading public health authorities.

ROCCAL is sure, safe, economical. It does not interfere in any way with plant operation.

ROCCAL is invaluable for use in the food, canning, dairy and ice cream fields because in effective concentrations, it is odorless, tasteless and non-poisonous.

ROCCAL contains no phenol, chlorine, iodine or heavy metals.

ROCCAL is non-corrosive. It does not injure fabrics, metal or rubber. In proper dilution, it does not irritate operator's hands.

ROCCAL is stable . . . maintains its high germicidal properties over long periods of use. Does not deteriorate in storage.

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about the uses of ROCCAL in your particular industry, *write today!*
Sample and literature on request.

Our armed forces are using ROCCAL at an ever-increasing rate. We are making every effort to keep up the civilian supply. Please be patient if you don't get ROCCAL on first call. Try again . . . it's worth the effort.

Industrial Division

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*BRAND OF BENZALKONIUM CHLORIDE—TECHNICAL

where necessary, to support the market under a plan similar to the one to be used for the purchase of dried eggs.

If it becomes necessary to support the producer's market, shell egg purchases will be made, as previously announced, on the basis of 27 cents per dozen straight-run. War requirements for top quality shell eggs in 1945 are larger than in 1944 and civilian needs are expected to be about the same as in 1944. It is probable that, unless shortages of egg cases, labor and transportation should interfere with normal distribution, these outlets will provide an adequate market so that buying for price support will be unnecessary.

Tank Cars Ample for Liquid Food Products

THERE will be no shortage of tank cars for the food industry during the next few months, says the Office of Defense Transportation. On the contrary, there will be a seasonal surplus that will not be needed until the grinding season opens next fall.

The national tank car fleet now amounts to 146,000, only 30,000 of which are used for the transportation of liquid products other than petroleum. Food products such as syrups and oils that are transported in tank cars are given a high priority by both WFA and WPB. For this reason, says ODT, shippers of liquid foods have access at all times to a sufficient number of tank cars to move their products. There is little likelihood of any change in this situation while the war lasts.

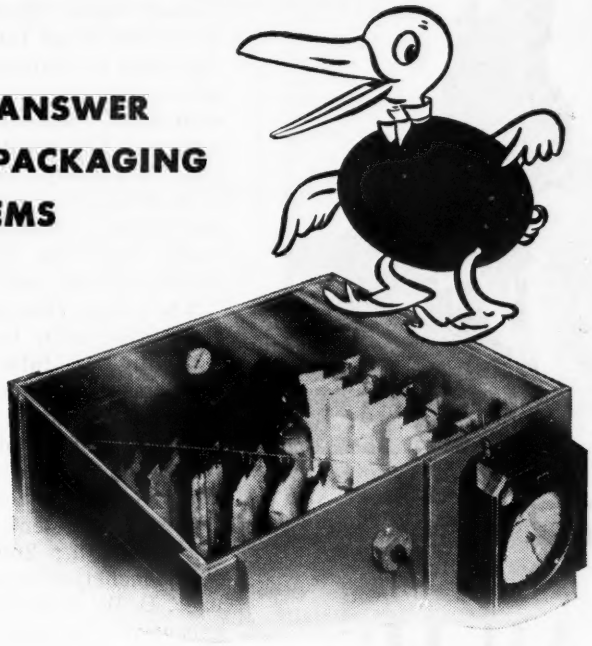
The vegetable oil season will be over about the last of March. The number of tank cars used in that service will decline from approximately 8,000 at the height of the grinding seasons to about 6,000, the normal number needed throughout the growing months. The molasses season is also over early in the year and tank cars are being released by that industry.

The movement of vinegar and milk is not affected by the overall tank car supply. Vinegar generally moves in wooden tank cars and milk in special types designed particularly for the purpose.

Unless there is a drastic change in the military situation which places additional demands upon the tank truck fleet, the situation in the near future is not expected to become more serious than at the present time.

This "MONSOON IN A CABINET"

HELPS ANSWER YOUR PACKAGING PROBLEMS



You can't afford guesswork in selecting the package for your products. You want the experimenting to be done *before* your products are entrusted to the packages.

And that's exactly the work of the Bemis Shipping Research Laboratory. To test Bemis Waterproof Bags, chemists and research specialists duplicate all varieties of weather conditions—even to a tropical monsoon. They duplicate extremes of shipping conditions, to test for strength. They try the chemical reactions of the commodities to be packaged.

In short, they give the bags "the works." And when our Research Laboratory says a Bemis Waterproof Bag will do your job, you can bank on it.

Bemis Waterproof Bags save you money, too. They cost less than other containers giving comparable protection and reduce shipping costs on both empty and filled bags. They speed up filling, closing and handling time and frequently reduce damage claims.

Mail the coupon today for the interesting booklet—"A Guide to More Efficient Shipping." And, if you wish, one of our representatives will, without obligation, call on you to discuss your packing requirements.

A STURDY PROTECTOR

Powdered, granular, crystal or lump form products frequently have a tendency to absorb moisture or odors. And, with ordinary packaging, there's danger of loss from vermin, dirt, contamination or sifting. But when your products are packaged in Bemis Waterproof Bags, they are protected from such dangers.

The tough closely woven outer fabric of Bemis Waterproof Bags is bonded with special adhesives to one or more layers of paper—thus producing the ideal shipping container for your product.

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Please send your special booklet, "A Guide to More Efficient Shipping," and details about use of Bemis Waterproof Bags for_____ (PRODUCT)

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*Mark for the attention of*_____

Five Tons and It's All His

Each soldier, heading for a fighting front, is supported by five tons of supplies . . . requires one ton per month while overseas.

The Army's Transportation Corps supervises the tremendous task of getting these supplies aboard ship, sending them to overseas ports, distributing them to far-flung battle fronts. One Transportation Corps company traveled 225,000 truck miles in England and France between D-day and the end of June.

Backing up the Army's Transportation Corps on the home front, 24 hours a day and seven days a week, are America's four million commercial motor trucks.

These hard-working, highway haulers are indispensable to the production and transport of virtually every one of the 700,000 different articles of food and fighting equipment required by our millions of overseas soldiers. This is evidenced by the estimates that 75 per cent of today's truck loads are war loads.

In addition to being one of the largest producers of military vehicles, GMC is also building many commercial trucks for essential users. If you are eligible for a new truck, your GMC dealer will gladly help you fill out an application. Remember, too, that GMC is headquarters for the original Preventive Maintenance Service.

INVEST IN VICTORY . . .
BUY MORE WAR BONDS

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GENERAL MOTORS

HOME OF COMMERCIAL GMC TRUCKS AND GM COACHES . . .
VOLUME PRODUCER OF GMC ARMY TRUCKS AND AMPHIBIAN "DUCKS"

Potato Chip Institute To Expand Its Research

TAKING stock of the past year and laying plans to extend its research activities, the National Potato Chip Institute held its limited wartime conference at the Netherland Plaza, Cincinnati, Jan. 30 and 31.

Approximately 150,000,000 lb. of potato chips was consumed in the United States during 1944, with 15,000,000 lb. of this amount being consumed by workers in war plants and service men and women in post exchanges, canteens and service centers. The institute plans to expand its research facilities in order to maintain the manufacturing and distribution facilities and demands made upon the industry by the armed services and war workers.

The potato chip industry, already confronted with the shortage and rationing of fats and oils, and problems of manpower, equipment and transportation, now faces the possibility of a potato shortage.

New officers elected are: President, G. C. Morton, Dallas, Tex.; 1st vice-president, T. T. Sachs, Rockford, Ill.; 2nd vice-president, H. Schachet, Denver, Colo.; treasurer, D. W. Mikesill, Dayton, Ohio; executive secretary, Harvey F. Noss, Cleveland, Ohio.

WPB Grants Appeal from Glass Container Curb

THE appeal of the Anchor Hocking Glass Corporation, Lancaster, Ohio, for relief from the restrictions of WPB's glass container and closure simplification and standardization order L-103 has been granted by the Appeals Committee of the Containers Division.

The company sought permission to manufacture and use non-standard jars for packing those food products for which the use of tinplate is permitted under Schedule B of Order L-103-b. The grant was made to permit use of an excess of home canning caps. Similar appeals from other companies that can establish an excess inventory of the same type closure will be accepted.

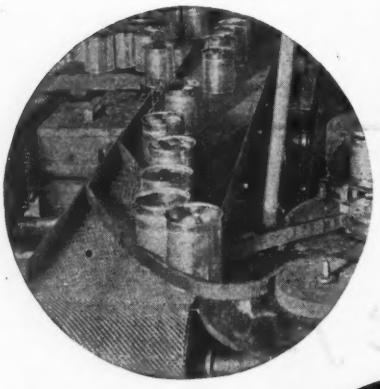
Tip-off to Bakers

AMONG the seven projects listed by the Federal Trade Commissioner in his request for next year's appropriation was one for the investigation of wholesale bakers. Even if the necessary funds are made available, nothing will be done on the tentative program until after the first of July.

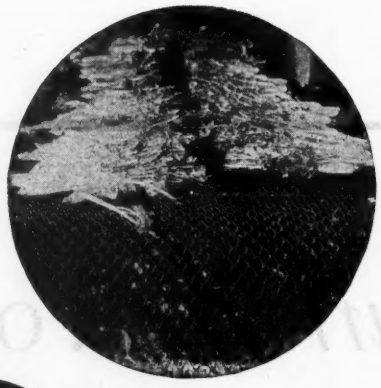
One *furrow* . . . one *faith*

No man can be master of all things. He may do many things well . . . even with considerable skill. ☆ But the true craftsman, the gifted creator, the great artist will always be found to have concentrated his genius in a *particular* field of endeavor. ☆ Back of any lasting work of literature or scientific development . . . behind the painted masterpiece or great industrial accomplishment, there is invariably singleness of purpose . . . unyielding devotion to one goal. ☆ In art and industry . . . in the creative loneliness of vision . . . *dedication to a single ideal is the road to achievement.* ☆ And when, in addition, that ideal is made into a dynamic, vibrant reality by men of energy and ability . . . the result is human progress. ☆ For more than 40 years, Dr. Willis H. Carrier and his associates have devoted themselves to the art and science of air conditioning and refrigeration.

CARRIER CORPORATION ☆ SYRACUSE, NEW YORK



CANNING



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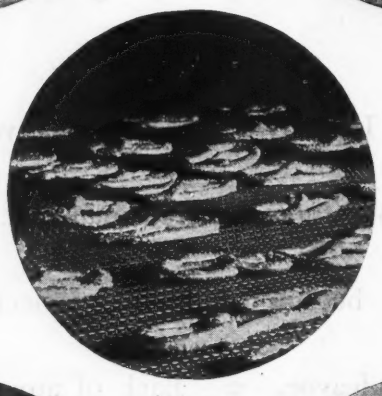

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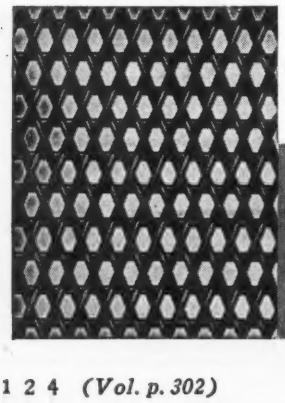
Un-interrupted Production With A Processing-Conveyor

Audubon "Metalwove" Continuous Processing-Conveyor Belts of "flexibly woven" wire eliminate the costly production delays of batch processing. Belts can be installed so they are self-loading and self-unloading, thus every operation becomes a smooth, continuous flow. In war-time this means more vitally needed production, and in peace-time it will mean more vitally important profits. You'll have an edge on competitors who neglect to streamline their processing with Metalwove Belts . . . Belts are made of stainless steel, monel metal or any other ductile metal. Various weaves are available to safely handle food products. Belts are supplied with retaining edge and with cleats for inclined conveying. They are easily cleaned and will give excellent service for continuous processing with oven heat, freezing cold, blanching steam or washing water . . . Our engineers will assist you in selecting the best type of Metalwove Belts, for every operation in your plant. Catalog on request.



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Foundation Replies in Vitamin D Patent Case

THE Wisconsin Alumni Research Foundation has filed a reply to government charges, in the U. S. District Court, denying illegality and violations in connection with the marketing of patented vitamin D products.

The Foundation asserts that all its actions were designed to safeguard the public interest and preserve legitimate royalty income. It further states it has been regulating the potency of vitamin D products because, "it is contrary to the public interest for food products to be fortified with vitamin D in therapeutic rather than prophylactic amounts with the result that foods so fortified would be sold as medicines." It justifies its refusal from time to time to issue licenses to some companies in order "to protect the public from having foisted upon it inferior, fraudulent or spurious vitamin D products."

The patents involved were obtained by Dr. Harry Steenbach of the University of Wisconsin. They cover a process of producing vitamin D by irradiation of various foods and medical preparations with ultra-violet ray light.

Incentive Provided For Surplus Resale

AIMING to overcome the reluctance of original suppliers and other processors to handle government-owned surplus food stocks, WFA is embarking on a plan to provide incentives for those taking over such surpluses. As a trial, a discount of 2 percent is to be allowed to the purchasers of canned snap beans provided their resales are made through bona fide brokers and that payment for the broker's services will equal or exceed that rate.

WFA hopes in this way to push the resale of surplus foods through regular channels of distribution.

AMA Flashes Red Light In Enrichment Program

THE council on foods and nutrition of the American Medical Association, although expressing itself in favor of vitamin enrichment of flour, bread and other cereal products, milk, table fats, and salt, does not grant its seal of approval to a multi-vitamin chocolated-coated candy bar trademarked Vi-Chocolin. The Committee opposes the addition of synthetic vitamins to carbonated beverages and confection-

The FMC Fog Fire Fighter is another Product of the Company that makes

FMC Food Canning Machinery

Back of every FMC product is the extensive research, creative engineering and manufacturing skill of Food Machinery Corporation.

SPRAGUE-SELLS DIVISION makes a full line of equipment for nearly every packing operation on many types of foods. Hoopeston, Ill.

FMC Original Fog Fire Fighters

EXTINGUISH HOT FIRES WITHOUT USUAL WATER DAMAGE!

By atomizing plain water at extreme high pressure (600 pounds at the nozzle!), this revolutionary equipment produces a dense, smothering and cooling fog that quenches even oil and gasoline fires with miraculous speed...and with minimum water damage.

Because of this equipment's phenomenal success in extinguishing all types of fires, use of high pressure fog is now an accepted part of the most up-to-date fire fighting technique. A special type of FMC Fog Fire Fighter was developed by Food Machinery Corporation for Army and Navy use in combatting the most difficult fires. After the war, city and rural fire fighting units all over America will use FMC Fog Fire Fighters to do a better job of saving lives and property...one more way in which FMC's designing, engineering and manufacturing resourcefulness will serve the nation.

FOOD MACHINERY CORPORATION

EXECUTIVE OFFICES: SAN JOSE, CALIFORNIA

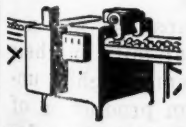
FMC Fog Fire Fighters are made by John Bean Mfg. Co. Division, Lansing, Michigan and Bean-Cutler Division, San Jose, California

LAKELAND
RIVERSIDE
HOOPESTON
LOS ANGELES
SAN JOSE

Other FMC Divisions and Typical Products

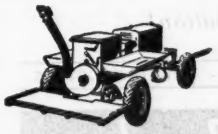
ANDERSON-BARNGROVER DIVISION. A complete line of machinery for canning foods. San Jose, Calif.

FLORIDA DIVISION... Produce Packing Equipment ...Flavorseal Protection & other processes. Dunedin & Lakeland, Florida.



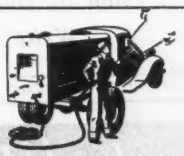
TEXAS DIVISION. Produce Packing Equipt., Canning Machinery, Flavorseal & other processes for fresh produce. Harlingen, Tex.

RIVERSIDE DIVISION. Produce Packing Equipment and Protective Processes, Automatic Box Making Machines. Riverside, Cal.



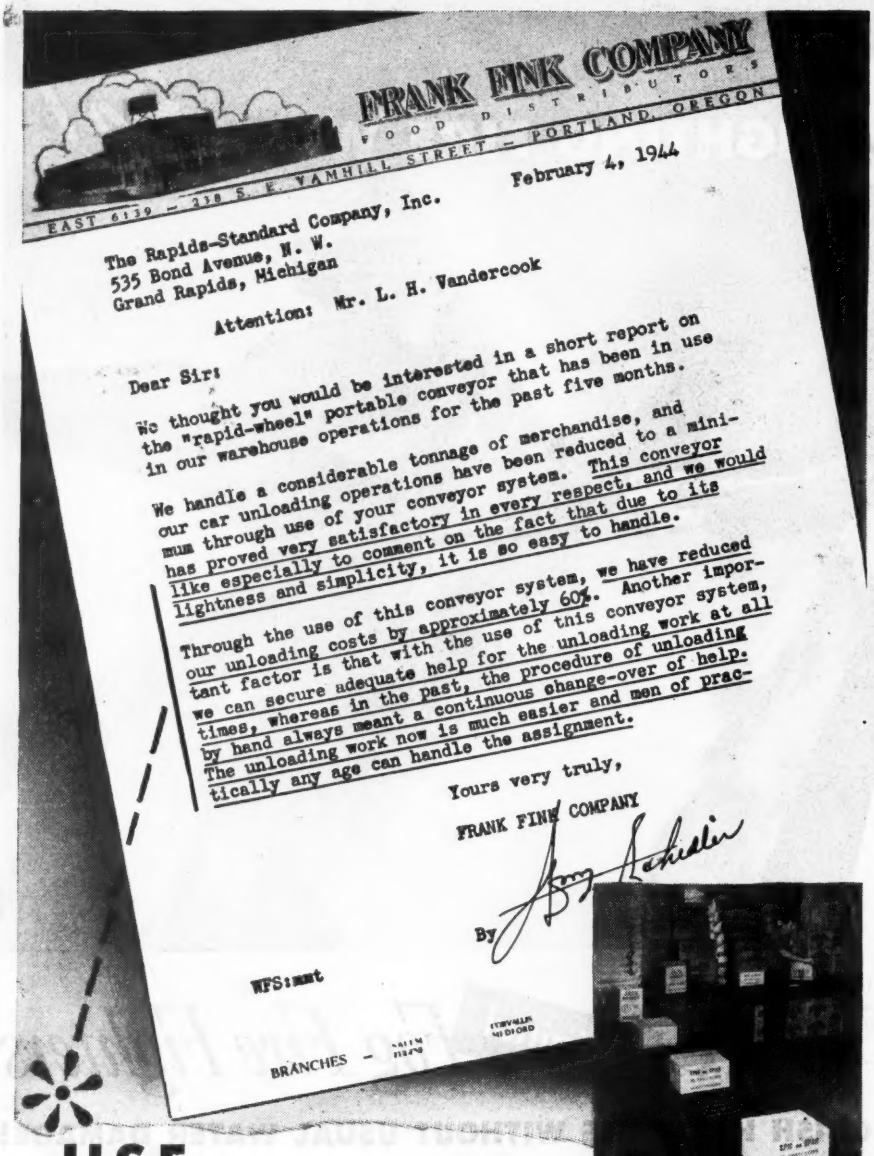
THE NIAGARA SPRAYER & CHEMICAL CO., INC. DIV. Insecticides. Middleport, N.Y.; Jacksonville, Florida; Burlington, Ont., Can.

PEERLESS PUMP DIVISION. Turbines, Hi-Lifts & Hydro-Foil type pumps for all purposes. Los Angeles & Fresno, Cal.; Canton, O.



JOHN BEAN MFG. CO. DIV. AND BEAN-CUTLER DIV.... also make Bean Orchard & Crop Sprayers. Lansing, Mich. and San Jose, Calif.

FMC's "WATER BUFFALO" amphibious tanks. Seven of FMC's fourteen major plants make amphibious tanks or sub-assemblies.


FRANK FINK COMPANY
FOOD DISTRIBUTORS
EAST 6139 — 238 S. E. YAMHILL STREET — PORTLAND, OREGON
February 4, 1944
The Rapids-Standard Company, Inc.
535 Bond Avenue, N. W.
Grand Rapids, Michigan
Attention: Mr. L. H. Vandercook
Dear Sir:
We thought you would be interested in a short report on the "rapid-wheel" portable conveyor that has been in use in our warehouse operations for the past five months.
We handle a considerable tonnage of merchandise, and our car unloading operations have been reduced to a minimum through use of your conveyor system. This conveyor has proved very satisfactory in every respect, and we would like especially to comment on the fact that due to its lightness and simplicity, it is so easy to handle.
Through the use of this conveyor system, we have reduced our unloading costs by approximately 60%. Another important factor is that with the use of this conveyor system, we can secure adequate help for the unloading work at all times, whereas in the past, the procedure of unloading by hand always meant a continuous change-over of help. The unloading work now is much easier and men of practically any age can handle the assignment.
Yours very truly,
FRANK FINK COMPANY
By
WFS:mt
BRANCHES

USE GRAVITY *and* REDUCE COST!

Unloading cost cut 60 per cent! This is the report of the Frank Fink Company of Portland, Oregon, user of a Rapid-Wheel Portable Conveyor for the past five months.

Gravity is the answer . . . doing the work which would normally require the use of several men. Rapid-Wheel Gravity Conveyor sections are light and strong. A full range of adjustments up to 50" operating height is provided by the patented "Cam-lock" stands which simply fold up under the Conveyor when not in use.

In these difficult times you need the type of service Rapid-Wheel Conveyors give you. The call is for speed . . . at a time when your man-power problem is most acute. Gravity operating Rapid-Wheel Conveyors give you speed, save your man-power . . . reducing your costs to a minimum.

Write today for full information!

Manufacturers of
STEEL FORGED CASTERS - TRUCKS - CONVEYORS - POWER BOOSTERS

The Rapids-Standard Co., Inc.

361 Peoples Nat'l Bank Bldg. Grand Rapids 2, Mich.

ery. Its refusal of seal of approval to this candy bar is in line with its belief that the consumption by the American people of highly purified carbohydrates is so high as to be of some public health concern.

New QMC Specifications

THE Quartermaster Corps has issued the following specifications. They are listed with the Chicago Quartermaster Depot number and date of issue:

Packaging and Packing Tea for Overseas Shipment, C. Q. D. No. 342, Nov. 7, 1944, Amendment-1, Jan. 20, 1945. Packaging and Packing Evaporated and Canned Condensed Milk for Overseas Shipment, Nov. 10, 1944, Used with Federal Specifications C-M-371, Evaporated Milk; C-M-321, Condensed Milk; Superseding C. Q. D. No. 174, Mar. 3, 1944. Packaging and Packing Canned Subsistence Items for Overseas Shipment, C. Q. D. No. 350, Nov. 15, 1944, Amendment—1, Jan. 13, 1945. Canned Beef and Gravy, C. Q. D. No. 151B, Nov. 28, 1944, Superseding C. Q. D. No. 151A, April 7, 1944. Service Style Lard, C. Q. D. No. 39B, Nov. 29, 1944, Superseding C. Q. D. No. 39A, Apr. 12, 1944, Used in lieu of Federal Specification EE-S-321, Feb. 11, 1944. Canned Ham and Lima Beans, C. Q. D. No. 301A, Dec. 9, 1944, Superseding C. Q. D. No. 301, July 30, 1944. Frozen Boneless Beef, C. Q. D. No. 11L, Dec. 12, 1944, Superseding C. Q. D. No. 11K, Mar. 24, 1944. Powdered Egg, C. Q. D. No. 117B, Dec. 12, 1944, Superseding C. Q. D. No. 117A, Jan. 28, 1944. Steamed Puddings, C. Q. D. No. 310A, Dec. 14, 1944, Superseding C. Q. D. No. 310, Aug. 19, 1944. Compressed Granulated Sugar, C. Q. D. No. 345, Dec. 14, 1944. English Style Stew, C. Q. D. No. 76C, Dec. 18, 1944, Superseding C. Q. D. No. 76B, June 8, 1944. Frozen Homogenized, Pasteurized Milk, C. Q. D. No. 344, Dec. 19, 1944. Wheat Flour, C. Q. D. No. 346, Dec. 28, 1944, Use in lieu of Federal Specification N-F-481. Emergency Parachute Ration, C. Q. D. No. 302A, Jan. 3, 1945, Superseding C. Q. D. No. 302, July 17, 1944. Aid Station Beverage Pack, C. Q. D. No. 347, Jan. 5, 1945. Ice Cream Mix, C. Q. D. No. 141B, Jan. 9, 1945, Superseding C. Q. D. No. 141A, Nov. 5, 1943. Vinegar, C. Q. D. No. 144A, Jan. 16, 1945, Superseding C. Q. D. No. 144, Oct. 13, 1943 and to be used in lieu of Federal Specification Z-V-401A.

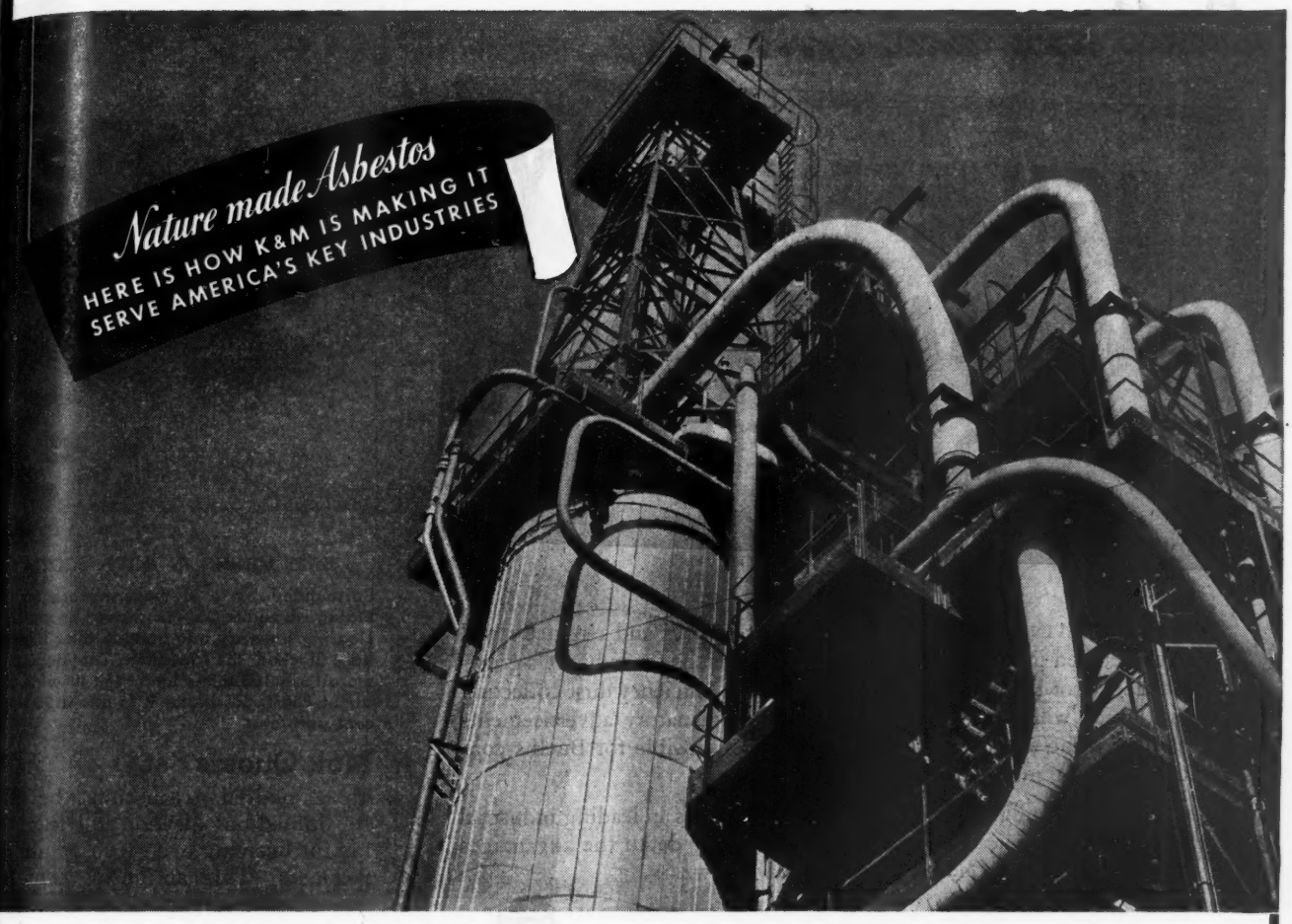
RAW MATERIALS

Sees Sugar Shortage Through Present Year

SUGAR SHORTAGE in the United States will continue unabated through 1945 in spite of the release of the Philippines from Japanese rule, according to Philip P. Gott, president of the National Confectioners' Association.

The islands' shipments to the United States ran close to 1,000,000 tons annually before the war. They totalled almost 900,000 tons in 1941, Mr. Gott said.

"Even if the Japanese are not destroying the sugar mills in their retreat, which seems highly unlikely, the maximum production of the islands would be required for our American troops, China and the other Allied forces in the Pacific operations area."



K&M High Temperature Insulations make *highways for heat*

• Oil, heated to 800° F., pours continuously through these pipes. They have been insulated with K&M Hy-Temp Combination and K&M "Featherweight" 85% Magnesia which help maintain exact temperature control at all times. These K&M Heat Insulations are serving many lines throughout this large refinery.

K&M High Temperature Insulations perform a vitally important function in this type of process. In addition to temperature control, they save a huge amount of heat and fuel. The efficiency of K&M Heat Insulations has been proved over the years in hundreds of plants in numerous branches of industry . . . especially in power plants.

K&M "Featherweight" 85% Magnesia is designed for temperatures up to 600° F.—Hy-Temp for temperatures reaching 1900° F. For further information on K&M High Temperature Insulations, write us.

ARMY E NAVY
K&M
best in asbestos

KEASBEY & MATTISON

COMPANY • AMBLER • PENNSYLVANIA

Buell's assurance of...

HIGH EFFICIENCY LOW MAINTENANCE LONG LIFE

BELIEVING that progressive plant executives and engineers will welcome detailed information pointing up the reasons for industry's growing preference for Buell's advanced design in high-efficiency dust collecting systems, Buell will inaugurate a series of six explanatory advertisements descriptive of the engineering factors largely responsible for Buell's constantly increasing installations.

Look for these enlightening dust recovery messages in leading industrial and engineering publications. They will technically detail the advantages of the six outstanding Buell features briefed below.

1. *The "Shave-Off"*... The patented van Tongeren principle, exclusive with Buell. Utilizes the "double eddy" current, establishing a highly efficient collection force.

2. *Large Diameters*... Permit use of extra thick metal. Afford large dust outlets, prevent clogging. Reduce abrasion.

3. *Extra-Sturdy Construction*... Rolled and welded, one piece construction; hoppers braced with 3" channels to withstand vibration.

4. *Correct Hopper Design*... Plays a most important, often disregarded, part in dust collection efficiency. Dust disposal facility must be anticipated in the initial overall design.

5. *Split-Duct Manifolding*... A prime factor in efficient distribution of the dust load. Buell's manifolding method has flexibility, discharging gases from any side or end.

6. *Inner Welds Ground Smooth*... Proper finishing of inner welds effects operating efficiency, reduces erosion, ensures longer life.

buell
DUST RECOVERY SYSTEMS

The interesting Buell book—*"The van Tongeren System of Industrial Dust Recovery"*—has been especially prepared for operating executives and engineers.

BUELL ENGINEERING COMPANY, INC.
Suite 5000, 8 Cedar Street, New York 5, N. Y.
Sales Representatives in Principal Cities

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

British Combine

SALT MINING IN NOVA SCOTIA

Surrounded by salt, these miners for the Malagash Salt Co., in Nova Scotia, are clearing the way into a stope after blasting had blocked the opening. The deposit is more than 100 miles long, 400 ft. wide and about 600 ft. in depth. It yields a 98.5 per-cent pure salt.

Malt Quotas Set

MORE malted grain must be used for industrial alcohol and the quotas for brewing are correspondingly reduced. This action governs the whole summer period to August 31, during which period, food and alcohol uses take precedence over beer making.

GENERAL

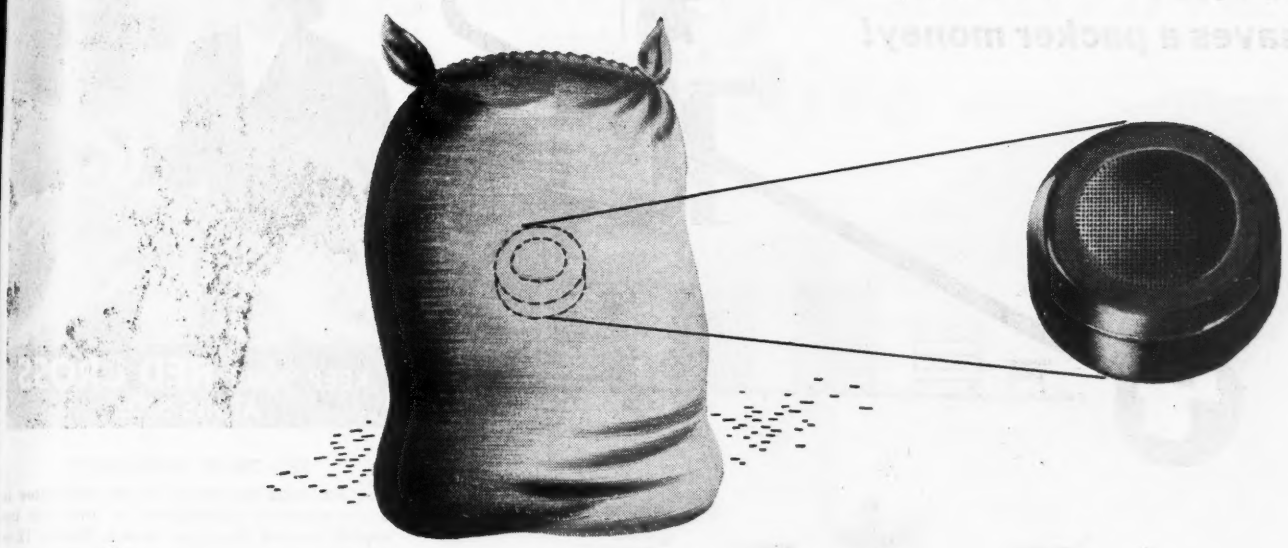
Food Industry Laws Introduced by States

WITH most of the state legislatures in session throughout the country, bills relating to the food industry took on added proportions during the past month. The American Institute of Baking reports bills to require the enrichment of white flour, bread and rolls, in at least 25 states. These bills are apparently uniform in effect as they follow the draft of model legislation worked out by the milling and baking industries.

In New York, state legislation has been introduced to extend the implied warranty of quality of merchandise not only to the buyer, but to his employees and members of his household. The seller would thus become an insurer of quality.

A bill providing that all canners and food manufacturers doing business in Missouri must register with and be licensed by the Secretary of State has already been introduced in that state's legislature.

ONE OF 31 DOW CHEMICALS USED BY THE FOOD INDUSTRY



HOW DO YOU MEASURE fumigation RESULTS?

It's a simple matter to check fumigation effectiveness—to determine whether there are any survivors that will cause early reinfestation. Here's how:

Before the fumigation, bury a suitable receptacle, containing a few live insects, in a spot so inaccessible that it will establish the effectiveness of the fumigant if reached. A good hiding place is the heart of a filled flour bag stacked in the middle of a large pile. The container can be simple. A jumbo capsule with air holes at both ends is excellent. Or a small box such as used by druggists for salve can be utilized by soldering fine mesh screen over holes cut in cover and bottom. Even a cardboard box will do—provided it is tight enough to retain the insects.

After the fumigation, a glance at the container shows whether a complete kill has been obtained. If you are not satisfied with present results, try Dow Methyl Bromide—the fumigant that "gets 'em all" because of its penetrating power—unmatched by any other fumigant. We'll gladly send further information.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago
St. Louis • Houston • San Francisco • Los Angeles • Seattle

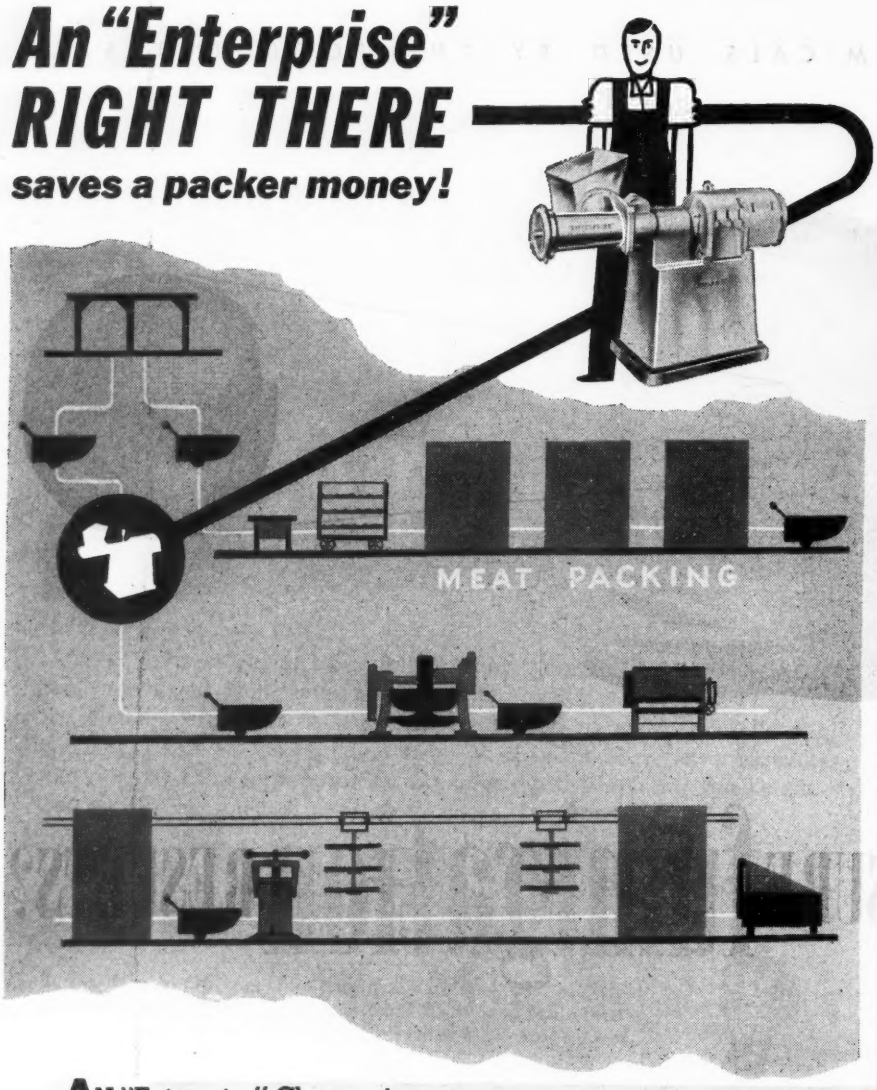
Methyl Bromide

The penetrating fumigant

DOW

CHEMICALS INDISPENSABLE
TO INDUSTRY AND VICTORY

An "Enterprise" RIGHT THERE saves a packer money!



AN "Enterprise" Chopper in the production line more than pays its way.

Our flow-chart shows where an "Enterprise" helps a packer get a better product at lower cost, thanks to the exclusive Enterprise system of cutting. Not only packers, though, but bakers, ice cream makers, canners, confectioners—any processors with a food-reducing operation—get with Enterprise a definitely improved product at a lower cost of operation and maintenance.

Food-reducing problems invited. Our experts, backed by more than 75 years' experience, are likely to come up with the one best answer.

The ENTERPRISE
System of Cutting
It's exclusive! *It's superior!*
The ENTERPRISE MFG. CO. of PA.
PHILADELPHIA 33, PA.
78 YEARS' EXPERIENCE BEHIND THE MODERN "ENTERPRISE"

RED CROSS DOUGHNUTS

The national doughnut week committee is using effective illustrations to promote the eighth annual doughnut week, March 12 to 18. This one also reminds the food store patrons that the Red Cross drive for much needed funds is now in progress.

Citrus Council Formed From Producing States

TECHNOLOGISTS from four citrus sections met recently at Tampa, Fla., to complete the organization of a national council to foster, stimulate and sponsor needed investigations relating to the processing of citrus fruits. The organization is to be known as the National Citrus Products Research Council.

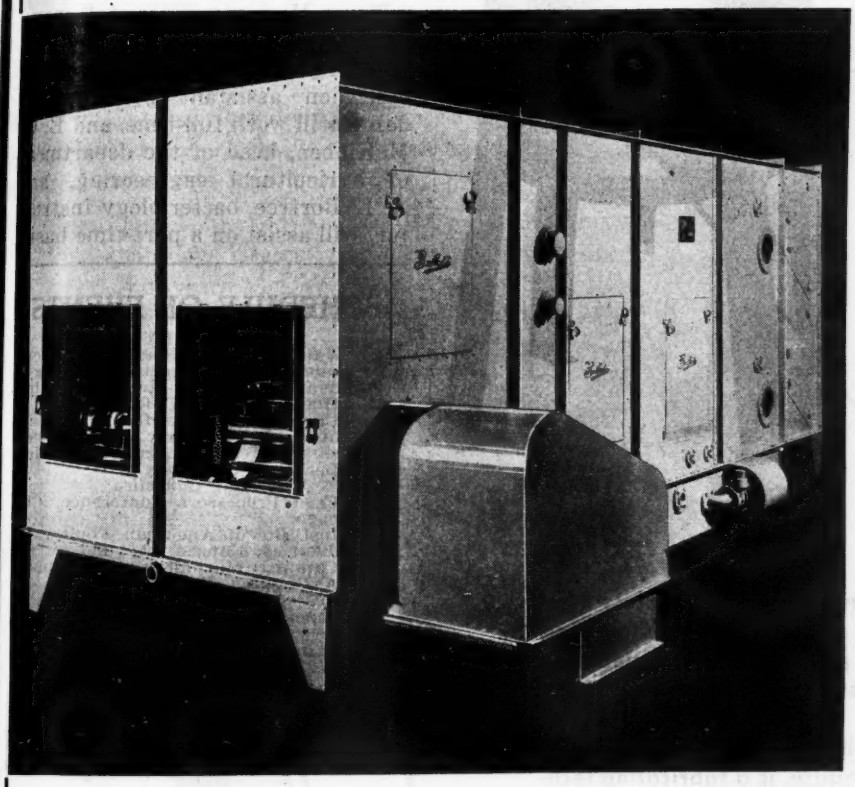
At a preliminary conference held in Los Angeles in September, 1944, a tentative plan of organization was drawn. At the Tampa meeting a formal constitution was adopted and officers were elected. Citrus technologists in California, Florida, Texas and Arizona organized state sections, each of which are represented in the national organization by an executive committee of five members.

J. L. Held, Florida Citrus Canners Cooperative, Lake Wells, Fla., was elected as the first president of the organization. Other officers include L. S. Hanne, Weslaco, and B. J. Showers, Phoenix, vice presidents; W. J. Platt, Hollywood, secretary-treasurer, and C. E. Wilson, Los Angeles, research chairman.

AACC Convention

THE American Association of Cereal Chemists will hold its 31st annual meeting, May 15 to 18, in Toronto, Canada, with headquarters at the Royal York Hotel.

Easily installed, inexpensive to operate, effective —



When you consider air conditioning — remember that you get exceptionally clean air, warmed or cooled as required, from Buffalo Wet Glass Cell Air Washers. These recently developed Buffalo Units protect against dust, pollen, soot and other air-borne particles; require no expensive electrical hook-up, last indefinitely.

The glass filter cells are sprayed with water, so that thoro air-cleaning is obtained. Coils for heating, cooling, humidifying or dehumidifying are furnished as required. Quiet Buffalo Fans distribute the conditioned air.

Send for this bulletin No. 3457 describing Buffalo Wet Glass Cell Air Washers.

Enjoy the benefits of "Buffalo" air conditioning equipment if your present or postwar plans call for such an installation. Write or call our nearest sales representative for full information.

Buffalo Forge Company

152 Mortimer Street Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

ARMY E NAVY

"Buffalo" "First For Fans"

Wet Glass Cell Air Washers

Section of round corner construction in cylindrical stainless steel vessel. Entire surface of corner is readily accessible for thorough cleaning.

This Construction SAVES MAN-HOURS IN CLEANING

In addition to superior corrosion resistance, stainless steel surfaces assure easier, quicker cleaning. Often, however, the form of the vessel itself may prevent *thorough* cleaning. Materials may gather in the less accessible *corners* of the vessel causing contamination.

***Round corner construction*, building your equipment with the corners *rounded* instead of square, is a fabricating technique which eliminates this danger. It gives you equipment which may be cleaned thoroughly in less time and with less danger of contamination.**

The techniques of round corner construction call for highly specialized experience and unusual fabricating equipment. We work exclusively with stainless steels and other corrosion resistant alloys. We offer our experience in the development of round corner construction as one of the ways in which we assure, during fabrication, longer service life and more efficient equipment. For your new equipment of stainless steel, consult with us.

S. Blickman, Inc., 4103 Gregory Avenue, Weehawken, N. J.

S. BLICKMAN, INC.
Guards Alloys in Fabrication

A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."

CORROSION RESISTANT PROCESSING EQUIPMENT

TANKS • KETTLES • STILLS • HEAT EXCHANGERS • AGITATORS • MIXERS • TOWERS • PIPING

Michigan State Accepts Swift Grant of $15,000

A $15,000 grant by Swift & Co., Chicago, to the agriculture experiment station of Michigan State College for use in a project relating to improvement of cream and milk for manufacturing purposes, has been accepted by the State board of agriculture, governing body of the college.

Three Michigan State staff members have been assigned to work on the two-year project. J. M. Jensen, extension assistant professor in dairy, will work full-time, and E. G. McKibben, head of the department of agricultural engineering, and A. L. Bortree, bacteriology instructor, will assist on a part-time basis.

SCHEDULE OF EVENTS

FEBRUARY

7—National Pickle Packers Association, board of directors meeting in lieu of cancelled annual meeting, Hotel La Salle, Chicago.

19–20—University of California, division of food technology, food processors conference, Agricultural Hall, Berkeley, Calif.

Officially Cancelled

4–6—Food Processors Conference, Chicago.

5–6—Institute of American Poultry Industries, Kansas City, Mo.

7—Canning Machinery and Supplies Association, Chicago.

MARCH

5–8—American Society of Bakery Engineers.

LECITHIN HEADQUARTERS of AMERICA

LECITHIN

FOR

FOOD

AND

TECHNICAL PRODUCTS

●

ROSS & ROWE, INC.

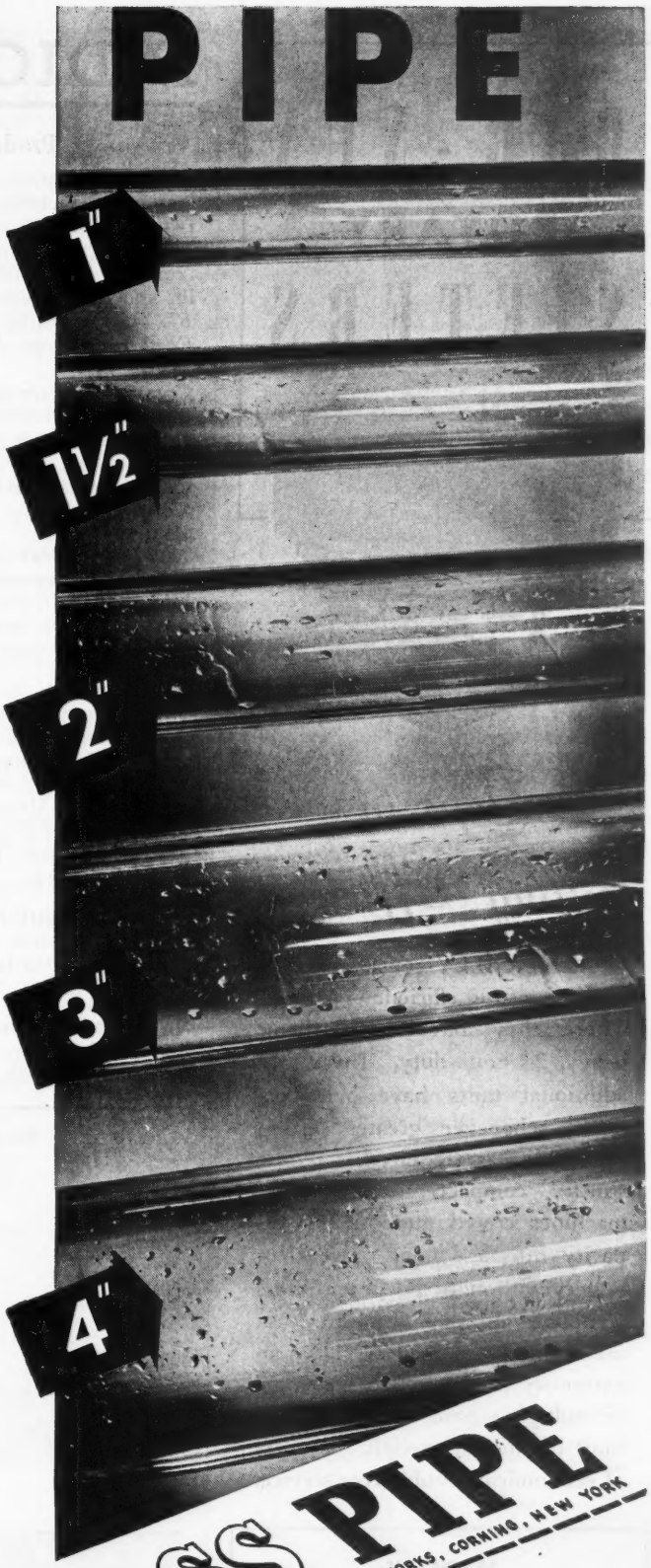
75 Varick St., New York 13, N. Y.
Wrigley Bldg., Chicago 11, Ill.

SOLE SELLING AGENTS FOR

AMERICAN LECITHIN CO.

PYREX PIPE

and fittings are supplied in . . .



If your process pipe requirements can be taken care of by 4" diameter pipe or smaller, you can have all of these advantages of PYREX Pipe.

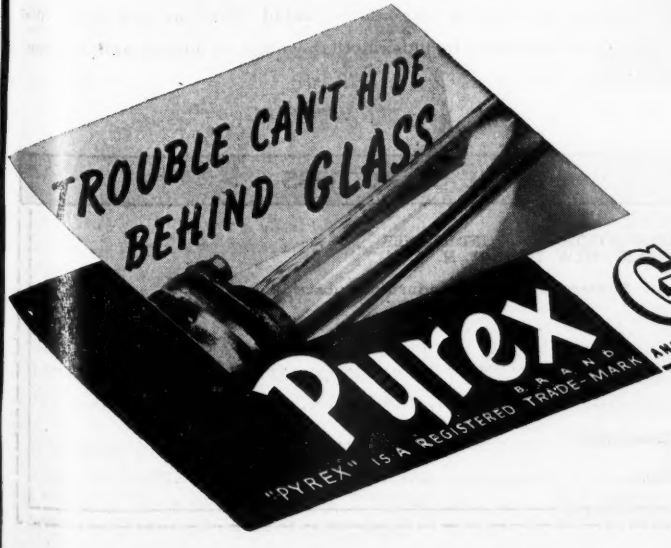
1. *Ruggedness* is proved by literally miles of PYREX Pipe that have been in actual plant service over a period of years.
2. *Transparency* of PYREX Pipe permits you to keep a visual check on your product as it is conveyed through the line.
3. *Corrosion resistance* of this special borosilicate glass gives PYREX Pipe a long life under acid conditions too severe for other materials.

In addition, PYREX Pipe withstands high temperatures and sudden changes in temperature. Also, because of the smooth hard surface, pressure drop in PYREX Pipe is appreciably less than in pipe lines of other materials.

All these features make PYREX Pipe an economical, practical material that can simplify your operating problems.

PYREX Pipe is stocked in all these diameters and in standard lengths of 10 feet. A stock of standard fittings and adaptors is also available. Where standard parts can be used, it will simplify your installation and stock maintenance. But where you prefer other lengths or special fittings, they can be easily furnished exactly to your specifications and with no excessive premium in cost. For full details write Industrial Sales Dept., FI3

CORNING GLASS WORKS
CORNING, NEW YORK



GLASS PIPE

AND INDICATES MANUFACTURE BY CORNING GLASS WORKS, CORNING, NEW YORK

INDUSTRIAL SALES DEPT., FI3
CORNING GLASS WORKS, CORNING, N. Y.

Please send me the following literature:

☐ PYREX Pipe Bulletin
☐ Installation Manual
☐ Adaptor Connections
☐ PYREX Valves

Name ..... Title .....

Firm .....

Address .....

BAR-NUN ROTARY SIFTERS

Tops in Sifting Efficiency

GENERALLY considered tops in sifting efficiency in plants where they have been doing heavy, 24 hour duty. Invariably additional units have been ordered whenever greater sifting capacity was required. These sturdy, compact, self-contained machines crowd more sifting capacity into less floor space than you ever thought possible. Offers complete Rotary Motion . . . mechanically controlled. Does an extremely thorough job on single or multiple separations. Precision-built of finest materials for years of economical, trouble-free service.

MADE BY:

B. F. Gump Co.

Established 1872

454 SO. CLINTON STREET
CHICAGO, ILL.

MAKERS OF: Equipment for Grinding, Mixing, Sifting, Weighing or packing of Food Products.

★

INDICATORS

Production

Frozen food production in California last year included 75,577,216 lb. of fruits and 34,936,084 lb. of vegetables. These figures are up considerably from the 1943 fruit pack of 40,663,638 lb. and the vegetable pack of 32,556,572 lb., according to Western Frozen Food Processors Association.

Creamery butter production in December was the lowest since 1924, being only 87,880,000 lb., or 23 percent under the 1933-42 average and between 9 and 10 percent below the same month a year ago.

American cheese production of 47,800,000 lb. in December was 17 percent higher than in the same month of the preceding two years and 48 percent above the 10-year average.

Flour output in January was up slightly, according to *The Northwestern Miller*. Production during January, 1945, totaled 15,504,166 sacks, representing 73 percent of the total output of the United States. This compares with 15,112,811 sacks in January, 1944, and 14,578,074 sacks in December, 1944.

Evaporated milk (case goods) production for 1944 was 3,434,055 lb., 13 percent above 1943 but a little below the 1942 record.

Sweetened condensed milk (skimmed and unskimmed combined) canned last year totaled 133,794,000 lb., exceeding the previous year's output by 13 percent.

Dry whole milk produced in December amounted to 13,250,000 lb., up 18 percent over that a year earlier and 281 percent above the 5-year average.

Nonfat milk solids produced by spray drying in December amounted to 18,550,000 lb., 32 percent larger than a year earlier, while the output by the roller process totaled 18,750,000 lb., up 110 percent over a year ago.

Packaged fish (fresh and frozen) produced in the United States in 1943 totaled 158,638,968 lb., valued at $37,589,065. Haddock, rosefish, flounder, whiting and cod were the principal species.

Tomatoes packed in 1944 totaled 25,577,297 cases of all sizes, National Canners Association reports.

Canned pea stocks (civilian) in canners' hands on February 1 amounted to 664,056 cases of Alaskas and 1,979,332 of sweets, according to National Canners Association.

Materials

Coffee imports into the United States in 1944 reached the high of 19,394,132 bags, or 16.2 percent more than in 1943, according to preliminary figures. Brazil accounted for the major part of the increase, shipping 10,805,457 bags last year.

Milk production on farms set a record in December. It was estimated at 8,-

Margarine Skyrockets as Butter Drops in These Estimates of Civilian Food Fat Consumption.
(From the U. S. Department of Agriculture)

Year	Butter (actual weight)	Margarine: Actual weight	Margarine: Fat content	Lard	Shortening	Cooking and salad oils[1]	Total[2]
Average			Pounds per capita				
1935-39	16.7	2.9	2.3	11.0	11.7	6.3	48.0
1940	16.9	2.4	1.9	14.7	8.9	7.6	50.0
1941	15.9	2.7	2.2	14.2	10.4	8.3	51.0
1942	15.6	2.8	2.2	13.6	8.9	8.1	48.4
1943	11.9	3.9	3.2	14.5	9.6	6.4	45.6
1944[3]	11.8	3.9	3.2	14.3	9.3	6.2	44.7
1945[4]	10.5	4.3	3.5	12.5	9.6	5.8	41.9

[1]Including refined fats and oils used in mayonnaise, salad dressings and other food products.
[2]Computed from unrounded numbers. Includes actual weight of butter and fat content of margarine.
[3]Preliminary.
[4]Forecast.

CHANGE OF ADDRESS

DIRECTOR OF CIRCULATION, FOOD INDUSTRIES
330 WEST 42nd STREET, NEW YORK 18, N. Y.

Please change the Address of my Food Industries subscription.

Name .....

Old Address .....

New Address .....

New Company Connection .....

New Title or Position .....

CONSTRUCTION NEWS

	Pending (thousands)	Awarded February (thousands)	Total Awarded 1945 (thousands)
Bakery	$ 398	$ 70	$ 70
Beverages	250	..	..
Canning and Preserving	1,160	332	792
Cold Storage	750	211	571
Confectionery	..	150	150
Grain Mill Products	390	40	190
Ice, Manufactured	80	40	138
Meats and Meat Products	..	..	142
Milk Products	170	175	315
Miscellaneous	1,383	330	863
	$4,581	$1,348	$3,231

8,700,000,000 lb., up 5 percent from a year ago. Production for the year was estimated as 119,200,000,000 lb., about 1 percent over 1943 and almost equal the record production of 1942.

Onions in storage in the hands of growers and dealers were placed at 10,859,000 sacks (50 lb.) as of January 1. This constitutes the largest January 1 holdings on record, exceeding holdings at the same time last year by 89 percent.

Sugar available for civilian use this year is expected by WFA to total 5,400,000 tons, with another 1,000,000 tons going to the armed forces and 600,000 tons to Great Britain, Russia and liberated areas. The civilian supply is about 700,000 tons less than consumed last year, being 78 lb. per capita against 88 lb. in 1944.

Livestock on farms on January 1 were fewer than at the wartime peak a year ago. The heaviest decline was a 28 percent drop in the number of hogs. But sheep herds continued their steady reduction, being down 7 percent, while cattle and turkeys were off 1 percent. In view of the record slaughter of cattle and calves in 1944, the decrease this year is relatively small. In terms of "animal units" that allow for differences in size and feed requirements, livestock numbers (excluding poultry) are 6 percent less than at the beginning of 1944 and 2 percent less than in 1943.

Indexes

Business activity index of *Business Week* stood at 227.4 for week ending February 10, lower than the 231.3 figure a month earlier and the 239.4 index of a year ago.

Cost of living index (1923 base) of National Industrial Conference Board was 105.7 in January, the same as a month earlier. It was 103.9 a year ago.

Wholesale price index for foods, compiled by Irving Fisher, was 122.8 on February 16, compared with 122.9 a month earlier and 121.0 a year ago.

DOLLAR EFFICIENCY—work done per dollar spent—measures the value of steam generation

Exclusive principles of combustion and design have given Cyclotherm an outstanding record of efficiency and economy among steam generators. Because of its combustion principles and design, Cyclotherm meets the dollar efficiency test throughout its wide power range (10 to 300 horsepower) in units that are both oil and gas fired.

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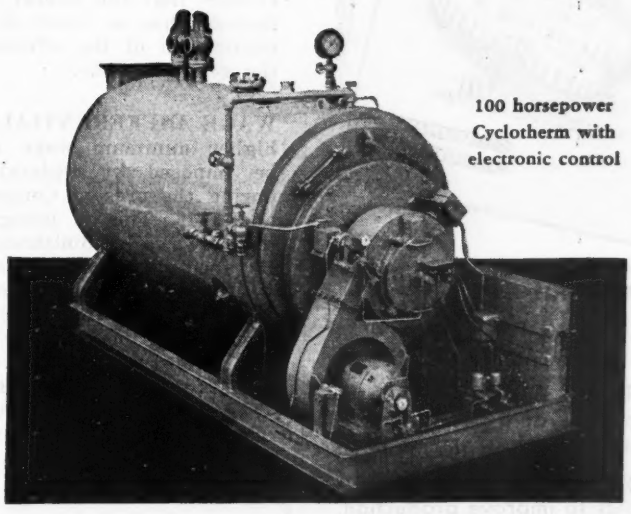
Cyclotherm Steam Generators are fully automatic, strongly built and fully self contained. They will give you years of trouble-free service for they are designed and constructed for exacting service with a minimum of attention.

While the range of available units obviously cannot be on a peacetime basis, if you are planning immediate replacement, our engineers will gladly cooperate in meeting your needs. Any additional information desired will be supplied promptly.



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What Washington Thinks

CONVENTIONS OUT!—"Conventions and similar gatherings in wartime seriously impede the war effort." This is the categoric statement of Colonel Johnson, chief of the Office of Defense Transportation. As a consequence, we need not expect any food industry conventions for some time to come. It may be, indeed, that this prohibition of group meetings will continue after V-E Day, because the transport problem still will be very bad as long as we are fighting the Japs. Numerous food industries have voluntarily canceled conventions. A very few have applied for such permits on the ground of war value. None were approved during the first six weeks of the year, and it looks as though few, if any, will be approved later.

ECONOMIC CHEATS—The annual report of Food and Drug Administration makes great point of its effort to eliminate "economic cheats." These are perpetrated by "those who, because of war conditions, take advantage of every emergency to reap illegitimate gains by manufacturing and selling debased food." F&DA emphasizes that this practice has been attempted by only a very small minority of food manufacturers. It is evident that the honest food manufacturer has as much to gain from elimination of the offenders as does the general public.

WAGE DIFFERENTIALS—A much higher minimum wage is likely to be imposed by Federal legislation during the present Congress of 1945 and 1946. This is going to require one of two administrative changes by food-plant manufacturers. They will have to increase all of the wages of those who are doing more than a minimum job or they will have to find some substitute for wage increases as a reward for good service. Wage differentiations between beginners and experienced workers, as well as those between low-level and higher level employees in responsible groups, must somehow be arranged without making the overall food labor cost too high.

QUANTITATIVE MICROSCOPY—Official Washington expects the food industry to increase its use of microscopic methods for food analysis and control of food quality. New methods are being developed constantly by chemists and microscopists that make this valuable instrument more and more quantitative. It is important that management recognize this trend. No large food plant can any longer be completely protected if it does not include service in the field of quantitative microscocy, either from its technical staff or from a consultant.

GOVERNMENT-OWNED PATENTS—Again Washington is trying to figure out what to do with the patents for which the government acquires ownership or control. Enemy-owned patents which have been vested with the Alien Property Custodian are being handled by that agency. But there is no general policy of making available for private use other patents which are actually the property of the government. The National Patent Planning Commission urges that Congress pass a law covering this situation so that industry can be given a license and thus be protected against charges of improper use of government property. This is a new idea; and it may take a long time for Congress to get around to the important subject, because Congress does not think it important.

TOXIC INSECTICIDES — Replacement of lead and arsenic in insecticides by organic materials has been a great comfort to food manufacturers because it eliminates toxic residues from food raw materials such as fruits and vegetables. But there

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apparently is a comparable problem with certain organic insecticides which have been thought safe. A recent release of information about Public Health Service investigations includes the following comment about DDT, which certainly indicates that the food industry must watch that commodity as well as the metal residues. PHS says: "Studies of new insecticides included investigation of possible toxic effects of DDT upon animals and human beings. It was found that DDT in air concentrations strong enough to kill insect life will not injure human beings, although heavy contamination of foods with the insecticide could have poisonous effects."

SUGAR SWINGS AGAIN—Almost every division of the food industry is deeply concerned about the recurring shortages of sugar. Apparently these swings in supply are going to continue for more than a year. Washington has made no successful arrangement to eliminate the curtailment of beet sugar production or the inadequacy of Cuban and Puerto Rican supplies. About all they have done is to make a brief gesture of restricting sugar usage in alcohol manufacture. Conservative critics of official activities think that a whole lot more could be done if reason instead of emotion were used in the program. The food manufacturer becomes the goat because he is going to have to get along with less than needed supplies of sugar for all of 1945 and perhaps another year after that.

WHO IS PINCHED—OPA is now maintaining that increasing costs of production must be more largely absorbed somewhere in the distribution system. They think that distribution takes too large a percentage of the consumer's dollar. They are using wartime authority to squeeze goods prices and eliminate some of this markup. Social planning at its worst, some call it.

WAGE CEILINGS — Washington again is tightening up on wage adjustments. A survey of big employers is being undertaken to be sure that increases in pay have not been granted by some indirect methods. The talk is still that the president's "hold the line order" must be observed. Disciplinary measures are being discussed for those who even indirectly up the pay envelopes outside of OPA rulings.

NEED ENRICHMENT?—The Food and Drug Administration has made an important point in the macaroni standards hearings on the question as to the need for enrichment of macaroni, spaghetti, noodles and similar products. Unless an industry is prepared to show that its products must be enriched to serve the public importantly, such industry when asking for vitamin standards will get a cool reception at F&DA.

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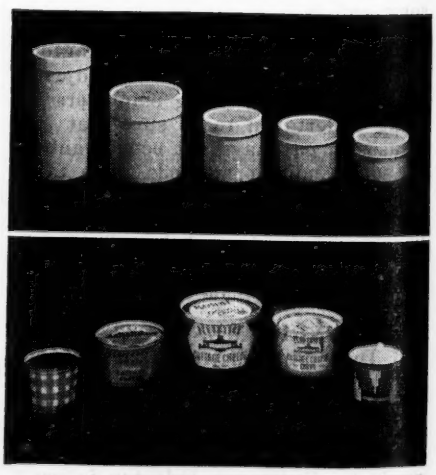

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MEN • JOBS • COMPANIES

INDUSTRY

Anheuser-Busch, Inc., St. Louis, through its president, Adolphus Busch, III, has confirmed reports of the company's purchase of an 18½-acre tract in Newark, N. J. According to Mr. Busch, the company plans to build a brewery on the site, "insofar as anyone can make plans today."

Bowman Dairy Co., Chicago, has engaged Dr. E. O. Herreid, professor of dairy manufactures at Vermont Agricultural College, to conduct a 16-week course in dairy technology for its employees. This is part of the company's employee education program initiated last fall. Bowman also announced its merger with the Cleveland Ice Cream Co., Cleveland. David H. Schlegel, president of the latter firm, said the company would continue operations unchanged.

Igleheart Bros., Inc., Evansville, Ind., has announced that it will consolidate all the firms under its management and that they will henceforth operate under the Igleheart name. These firms are: Union Elevator Co. and Phoenix Mills, Evansville; Indiana Flour Co., Gainesville, S. C., Memphis, Tenn., and Dothan, Ala.; Dunlop Milling Co., Clarksville, Tenn.; Atlas Mills, Vincennes, Ind., and Collins Flour Mills, Pendleton, Ore.

Marhoefer Packing Co., Chicago, has purchased the Fort Wayne plant of the Kuhner Packing Co., Muncie, Ind., for more than $500,000. Elmer J. Strasser will be retained as manager of the Fort Wayne plant.

Morgan Milling Co., Jacksonville, Ill., is planning the early construction of a 150,000-bu. capacity soybean mill and storage plant.

Morrell & Co., Ottumwa, Iowa, has awarded the general contract for $150,000 addition to its meat packing plant in Cedar Rapids.

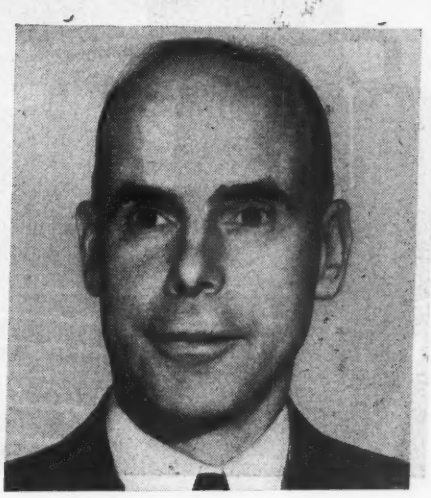
Charles A. Noble Co., vinegar, sauerkraut and alcohol manufacturer, suffered damage amounting to $250,000 from a fire at their plant near Clyde, N. Y., during January.

Post Products Division, Battle Creek, Mich., nucleus company of General Foods, recently observed its 50th anniversary. The company was founded by the late C. W. Post and began operations January 1, 1895.

Shedd-Bartush Foods, Inc., Detroit, recently purchased the B. S. Pearsall Butter Co., Elgin, Ill. Raymond M. Pearsall, president of the Pearsall company for the last ten years, will act as vice-president and general manager in charge of the Elgin plant.

WILLIAM CALLAN

Recently retired as vice-president of the Borden Co., William Callan, along with Frank E. Crawford, of Crawford, Keen & Cia., Buenos Aires, has established the firm of Crawford, Callan & Co., export and import commission merchants and representatives of foreign and domestic shippers.



ARMAND W. DeBIRNY

Until recently with the military intelligence of the U. S. Army, Maj. Armand W. DeBirny has joined the executive staff of Loose-Wiles Biscuit Co., as a member of the employee relations board of the organization and as an assistant to the general council of the Sunshine company.

Stokely-Van Camp, Inc., Indianapolis, has acquired all outstanding stock of the Hoopeston Canning Co., Hoopeston, Ill., one of the oldest canneries in the Middle West. Farm land holdings, farm equipment and buildings, factory and office property are included in the transaction.

DONALD V. JOSEPHSON

Now assistant professor of dairy husbandry at Penn State, Dr. Donald V. Josephson will join the Ohio State faculty on April 1. Dr. Josephson will have the rank of associate professor of dairy technology and will be in charge of teaching and research relating to ice cream, evaporated and condensed milk and milk powder.

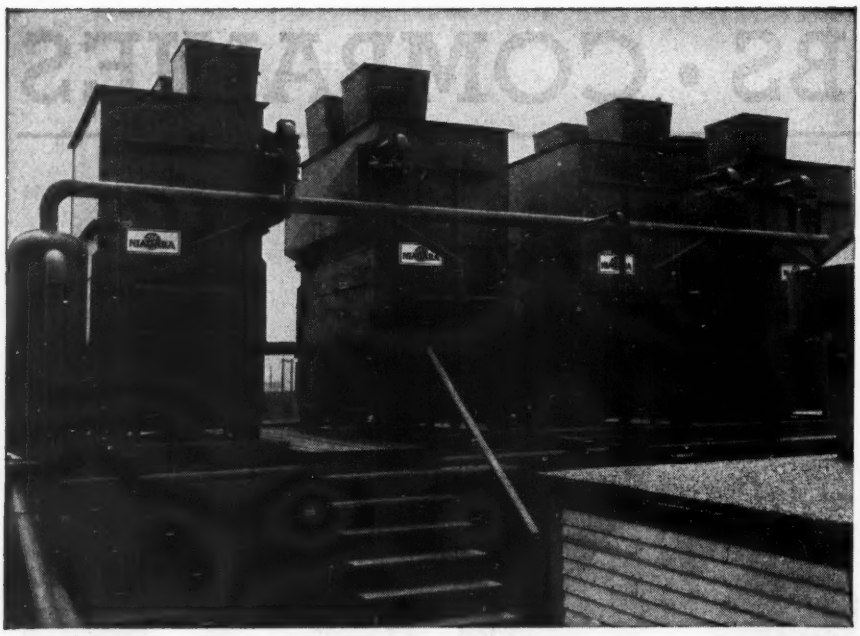
The University of Louisville has established the Institute of Industrial Research. The new organization, in addition to employment of a small permanent technical staff from different scientific and technical fields, will depend for assistance in supervision on selected staff members of the engineering and scientific faculty. The Institute will conduct engineering and scientific research.

PERSONNEL

James S. Adams, president of Standard Brands, has been appointed a temporary consultant on public relations to the War Production Board and the War Manpower Commission.

Dr. Eugene C. Auchter has been made director of the Pineapple Research Institute of Hawaii and a member of the executive staff of the Pineapple Growers Association of Hawaii, according to an announcement of the latter association. Dr. Auchter has been associated with the United States Department of Agriculture since 1928, and when he resigned was the administrator of agricultural research. P. V. Cardon has been named to succeed Dr. Auchter in the Department of Agriculture.

John L. Buckner, who has been associated with the Corn-Products Refining Co. since 1912, has been elected



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a vice-president. In his new capacity, Mr. Buckner will handle manufacturing operations and personnel.

Robert E. Carson is now production manager with the Armstrong Food Co., Inc., Sherbourne, N. Y. Mr. Carson held a similar post with the Gaines Food Co., Inc., for four years.

Edwin Broun Fred, a member of the faculty of the University of Wisconsin College of Agriculture since 1913 and dean of the school since 1943, has been elected to the presidency of the university. Mr. Fred took office February 15 succeeding Clarence A. Dykstra, who resigned to become provost of the University of California at Los Angeles.

A. Kirk Frederick, formerly general manager of the Fruit Growers Cooperative, Sturgeon Bay, Wis., is now head of the Central Processors & Briners, Ellensburg, Wash. The newly organized company brines cherries, cold packs fruits and cans fruits and vegetables.

George Low is now production manager of H. A. Johnson Co., Boston, succeeding William C. Launder, who is now with Max Ams Co., New York. Mr. Low has been with the Johnson Co. for 17 years.

Carlton D. McKenzie has been reelected president of Millers National Federation. Mr. McKenzie is president of the McKenzie Milling Co., Quincy, Mich.

Charles Walts, formerly with the Creamery Package Mfg. Co., Chicago, is now with the Hershey Creamery Co., Harrisburg, Pa.

DEATHS

Donald W. Boyd, 45, president of Henry & Henry, Inc., Buffalo, basic food manufacturer, Jan. 11, in Buffalo.

Robert R. Clark, 83, long identified with Aunt Jemima Mills Co., Kansas City, Jan. 27, in Claremont, Calif.

Joseph Kohnstamm, 84, until his retirement in 1936 a member of the firm of H. Kohnstamm & Co., Inc., New York, Jan. 18.

Eshelby F. Lunken, 54, president of the Lunkenheimer Co., Cincinnati, Jan. 25.

Henry Silas McGowan, 78, a pioneer figure of the fish packing industry, Jan. 21, at McGowan, Wash.

David W. McMorran, 74, leading chicory manufacturer, Jan. 9, in Port Huron, Mich.

Philip Schaefer, 78, president of Philip Schaefer & Sons, Inc., recently, in Philadelphia.

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AND ECONOMICAL TO USE IN ANY TYPE OF FOOD PROCESSING

Use Republic ELECTRUNITE Stainless Steel Tubing for dairy products—for tomato juice or mayonnaise—for any type of food processing—and you'll find it both SAFE and ECONOMICAL.

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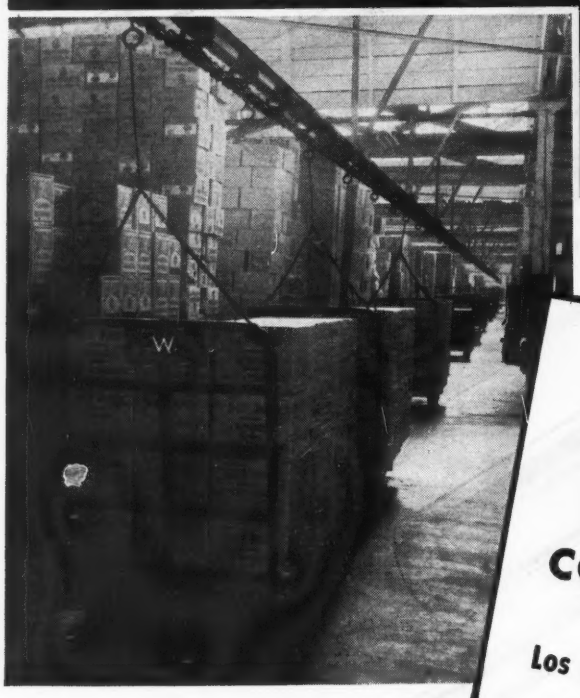

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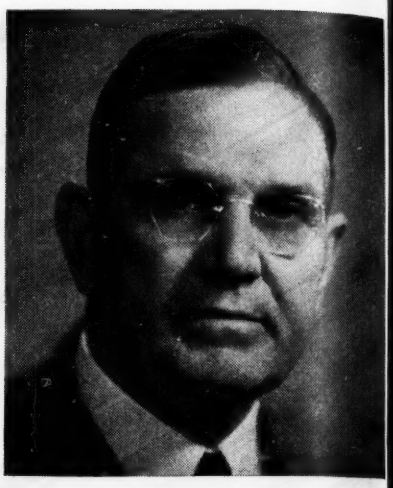

ROBERT MULLREE

One of the pioneers of the canning industry and active in the business for almost 50 years, Robert Mullree, 70, Birds Eye-Snider production executive, died in Rochester, N. Y., January 23, after a brief illness.

Claude E. Street, 77, pioneer grapefruit juice canner and one of the founders of the Florida Grapefruit Canners Association, Jan. 10, at Winter Haven, Fla.

Harry Phillips Trevithick, 58, chief chemist of the New York Produce Exchange, Jan. 17, in New York.

ASSOCIATED INDUSTRIES

American Machine & Foundry Co. has elected Roland P. Soule as vice-president in charge of research and development. Mr. Soule is a lecturer in Columbia University's department of chemical engineering and a trustee of the Chemists Club.

Cochrane Corp., Philadelphia, has been awarded second renewal of the Army-Navy "E" production award. Hooker Electrochemical Co., Niagara Falls, N. Y., has received the same award for the fifth time, Infilco, Inc., Chicago, for the third time, and Victor Chemical Works, Mt. Pleasant, Tenn., for the fifth time.

Continental Can Co. has named L. H. Skougor as general manager of the production planning department, according to an announcement by Carle C. Conway, chairman and president of the board. Mr. Skougor was formerly manager of the company's plant in Jersey City, N. J.

General Meters & Controls Co., Chicago, has been appointed district representative for Northeastern Illinois and Northwestern Indiana by the American District Steam Co., North Tonawanda, N. Y., manufacturers of ADSCO products for steam distribution.

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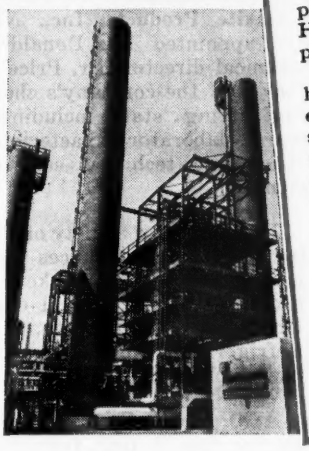

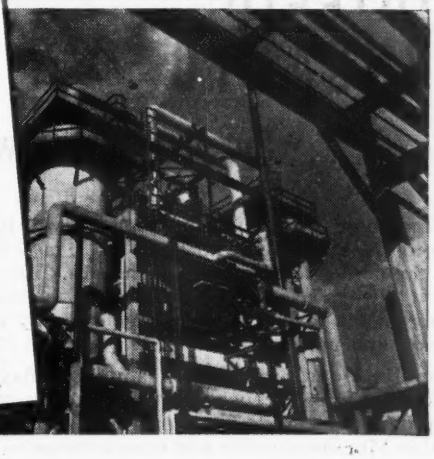

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Mile after mile of lines, hundreds of vessels and heat exchangers were insulated speedily and effectively by the skilled mechanics of Armstrong's Contract Service. Here, piping and equipment which carry liquids and gases at 200° F. to 850° F. are insulated by 85% Magnesia Pipe Covering and high-temperature insulation.

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YEARS OF EXPERIENCE in engineering both large and small jobs is an advantage that pays you dividends when you use Armstrong's heat insulation contract service. It assures planning and supervision that speed work and keep costs low. In addition, Armstrong's complete service provides materials of tested efficiency; also skilled, experienced mechanics for installation. Armstrong takes full responsibility for every phase of the work. For detailed information, write to Armstrong Cork Company, Building Materials Division, 4203 Concord Street, Lancaster, Pennsylvania.

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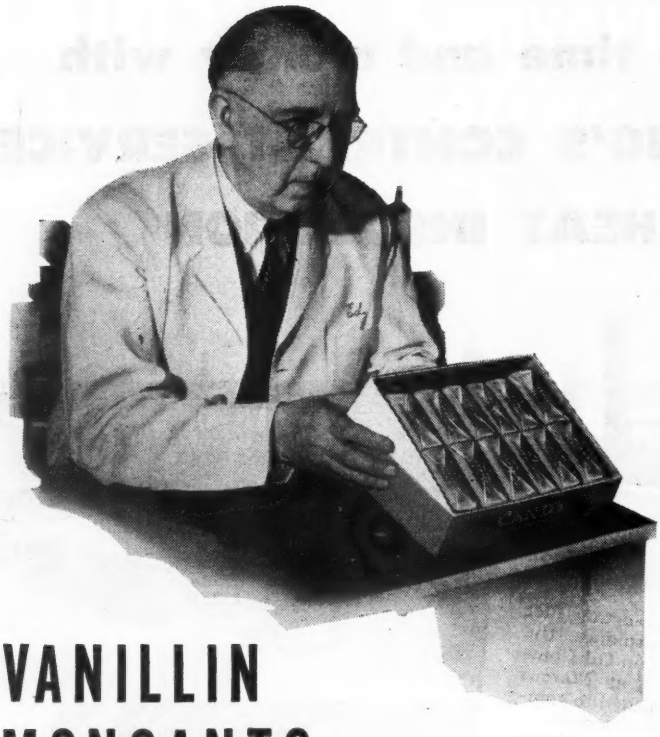

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The merchant who puts a popular postwar item on display . . . and the customer who buys it . . . may not know that it is flavored with Vanillin Monsanto. But they *do* know that it always has uniform, delicious flavor. That is why the merchant favors it in displays . . . why customers buy it again and again.

Vanillin Monsanto *always* has uniform flavoring strength and true aroma, because it is produced by precise methods . . . under strict laboratory control. This uniformity makes Vanillin Monsanto easier and more economical to use in your product. And the Monsanto-made materials that go into Vanillin Monsanto are produced with the same exacting care.

We are looking forward to the day when we can supply all customers with the Vanillin Monsanto they need. Until then, we, like yourself, are doing our utmost to meet the demands of the times. We can, however, send you samples and we shall be pleased to give you complete information. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.
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Can Manufacturers Institute announces the election of George A. Milton, head of the Brooklyn can company bearing his name, to the presidency. Mr. Milton has been a member of the board of governors of the Institute since its formation in 1939.

The Girdler Corp., Louisville, has elected George O. Boomer as president to succeed Walter H. Girdler, Jr., who died Jan. 7. Mr. Boomer remains as vice-president and a member of the board of directors of the firm's affiliate, Tube Turns, Inc.

Inland Container Corp., Indianapolis, is welcoming the return of W. B. Lincoln, Jr., to his former position in charge of development and research. Mr. Lincoln recently has been serving as principal supply specialist in the packing and crating section, Office of the Quartermaster General, Washington.

W. L. Hunter is the new chief engineer for the Northern Equipment Co., Erie, Pa. Mr. Hunter has been associated with the company for 18 years.

Oakite Products, Inc., New York, has appointed Dr. Donald Price as technical director. Dr. Price will have charge of the company's chemical and engineering staff including its research laboratory, bacteriological division and technical service department.

The American Society of Refrigerating Engineers announces the appointment of J. Mack Tucker, associate professor of mechanical engineering, University of Tennessee, as editor of **Refrigeration Abstracts,** the society's new publication.

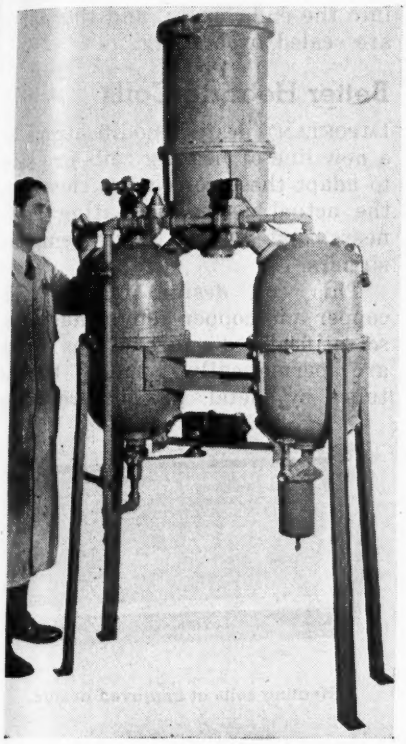
A. O. Smith Corp., Milwaukee, has elected Rae F. Bell, former first vice-president, as chairman of the board of directors to succeed the late L. R. Smith.

Specialties Manufacturing Co., Bloomfield, N. J., a wholly owned subsidiary of Walter Kidde & Co., Inc., has been renamed the Kidde Manufacturing Co., Inc., according to an announcement by Walter H. Freygang, president of the firm.

Whiting Corp., Harvey, Ill., through G. E. Seavoy, vice-president and manager of Swenson Evaporator Co., a subsidiary, announces the appointment of Sam Van Deest to be manager of its Douthitt Gray-Jensen Department, manufacturers of spray-drying equipment.

Sylvania Industrial Corp. has elected John W. Little to the board of directors and placed him in charge of sales of cellophane, casings for meats and self-sealing bands. Mr. Little, who is also vice-president, will supervise the general sales force, branch offices and warehouses.

FOOD EQUIPMENT NEWS



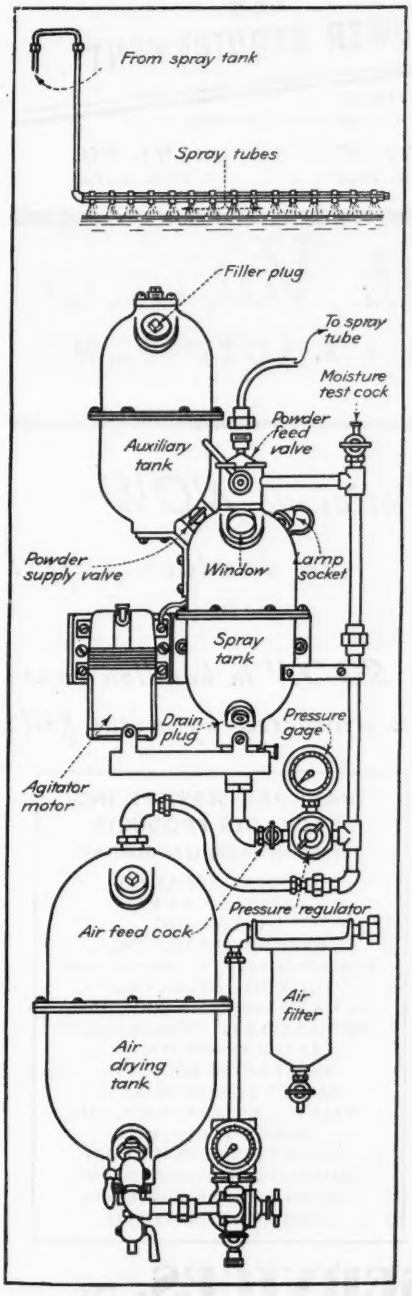
Powder depositer.

Powder Depositor

CONTROLLED automatic spraying of powder at extremely low pressures is accomplished by a new dry powder spray unit made by Craig Corp., 143 West 20th St., New York.

The spray is applied automatically and uniformly without waste or spoilage, and without creating an excessively high atmospheric dust count. Air flotation of dust particles or mist from liquid vehicles is avoided. This is accomplished by so gently depositing the dust that it is difficult to measure any pressure at the point of delivery—the manufacturer estimates it at less than 1 oz. Dry powders can be delivered to within a few inches of the objects treated, with satisfactory results. The powder is gently deposited where needed, and not scattered by strong blasts as in the conventional air dust sprays.

The unit consists essentially of four parts. A dehydrator to suitably dry the air before entering the system, an auxiliary tank serving as a supply tank, a spray tank in which air is introduced into the powdered material to produce a cloud of "powder-laden air," and the delivery unit to deliver the powder where needed. Spraying is accomplished by passing dehydrated air through the powder from the bottom of the spray tank. The air, aided by a motor-driven agitator, creates and maintains a cloud of powder-laden air in the upper half of the spray tank. This is visible through a sight glass located at the upper half of the spray tank, which is internally illuminated while the spray is operating. The cloud of powder-laden air is ejected by compressed air to a powder feed valve located at the top of the spray tank. The powder is delivered to the material to be sprayed by means of one or more spray tubes containing a number of ports.



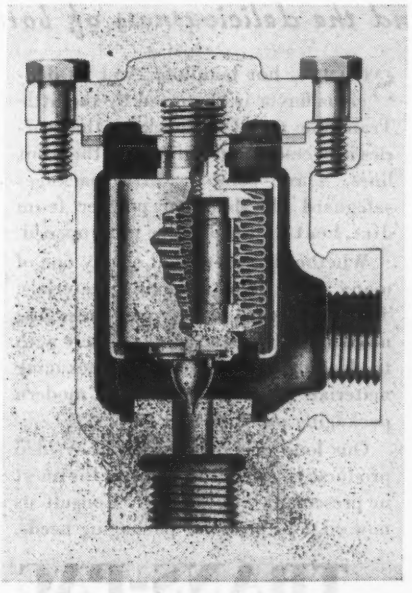
Details of powder depositer and spray tube.

Units are made in three sizes which will uniformly deliver predetermined quantities of powder from 1 to 90 lb. per hour. Generally speaking, powder materials with a moisture content not in excess of 12 percent and a particle size of 100 mesh or finer can be handled. Confectioners, stick chewing gum manufacturers, bakers and other food processors who deposit dry powdered materials on the surface of a product may find this unit worth investigating.

Improved Steam Trap

THERMOSTATIC steam traps at pressures above 50 p.s.i. have been restricted to small equipment because flexible bellows of sufficient strength could be made only in small sizes. Sarco Co., Inc., 475 Fifth Ave., New York 17, now announces successful manufacture of bellows from heavy bronze tubing.

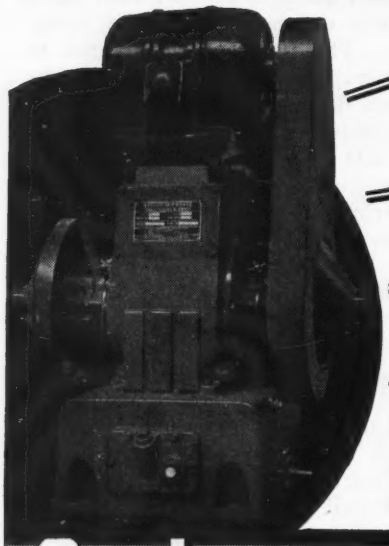
This makes possible an entirely new line of thermostatic steam traps for pressures up to 225 p.s.i. using single, larger diameter bellows, for inlet sizes of ½ to 2 in. inclusive. The capacities of this series are double those of the com-



Large-capacity, high-pressure thermostatic steam trap.

Stokes MICROVAC Pumps

HEART OF HIGH VACUUM SYSTEMS



HIGHER VACUUM
in the Low Micron Range

GREATER
VOLUMETRIC EFFICIENCY

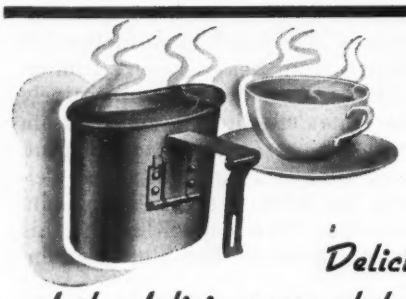
LOW
POWER REQUIREMENT

FIVE SIZES:
from 15 to 225 cu. ft. per min.

F. J. STOKES MACHINE CO.
5976 Tabor Road Phila. 20, Pa.

Stokes *High Vacuum*

PUMPS · GAUGES · EQUIPMENT



Delicious NOW in canteen cups!

Delicious SOON in bouillon cups!

and the deliciousness of both is protected by metal foil!

STEAMING hot bouillon! And its delicious flavor is protected by the little Trans-Pac metal foil package that carries it overseas and right up to the front lines. These compact little packages safeguard the bouillon powder from dirt, heat and moisture until opened.

Whether it's metal foil or any one of many other fine packaging materials, Trans-Pac can plan your packaging needs now. Our staff works closely with the leading manufacturers of packaging materials to bring you the best modern packaging possible.

Our long experience with diversified products enables us to turn out the finest in present-day packaging. Consult us now on your post-war packaging needs.

TRANS-PAC SERVICES, INC.
PACKAGES PRODUCTS
for the following organizations:

EASTMAN KODAK CO.
CAMPBELL'S SOUP CO.
J. C. ENO, INC.
CHEF BOY-AR-DEE INC.
LEADER NOVELTY CANDY CO., INC.
GENERAL MILLS, INC.
C. J. VAN HOUTEN & ZOON, INC.
THE ANACIN CO. "WHITEHALL"
CARTER PRODUCTS, INC.
BREAKSTONE BROS., INC.
MARLON CONFECTIONS CO.
WALLACE & TIERNAN CO., INC.
DORSET FOODS, LTD.
CONFECTION CABINET CORP.
AMERICAN DIETAIDS CO., INC.
UNION FOOD PRODUCTS CO.
ROMANOFF CAVIAR CO.

TRANS-PAC SERVICES, INC.
602 WEST 52nd STREET, NEW YORK 19, N. Y., U. S. A.

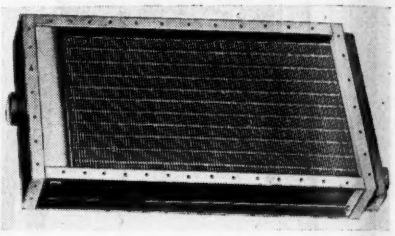
pany's No. 9 series. The new traps are available in two pressure ranges, No. 9-100for pressures of 0 to 100 p.s.i. and No. 9-225 for pressures of 0 to 225 p.s.i.

The heavy bellows is screwed into the end closure, and the joints are sealed by brazing.

Better Heating Coils

IMPORTANT design modifications in a new line of heating coils are said to adapt these coils more closely to the actual needs of heating engineers and drying equipment designers.

This coil design features all-copper and copper-alloy condensers, scientifically die-formed fins which are permanently bonded to the tubes by metal, pressure-resisting



Heating coils of improved design.

brazed construction of steam carrying passages, and new provision for even steam distribution within the coils. Casings are designed for duct installation in vertical or horizontal positions and permit the use of ducts having cross-sectional areas no larger than the face of the coils.

One of the special features of these blast heaters is that the ordinary flat fin has been replaced by a die-formed wavy fin to turbulate the air, compelling it to mix and wipe both fin surfaces for greater heat transfer.

Included in the line are blast heaters and booster units of various widths and lengths which provide a total of 561 individual coils from which to meet requirements. The line is manufactured by the Modine Mfg. Co., Racine, Wis.

Vacuum Gage

A NEW all-metal thermocouple vacuum gage has been introduced by National Research Corp., Boston 15, Mass. The gage is of rugged construction and is assembled in a metal envelope. Connection to the vacuum system is made through a standard ⅛-in. IPS hexagonal shank pipe nipple. The control unit for the gage operates directly from 110 volts a. c. and indicates pressure in the range between 1 and

HANDLING+Processing+HANDLING+Assembling+HANDLING+Packing+HANDLING+Storage+HANDLING

HANDLING—the Common Denominator of PRODUCTION

LET MEN DIRECT POWER—NOT GENERATE IT!

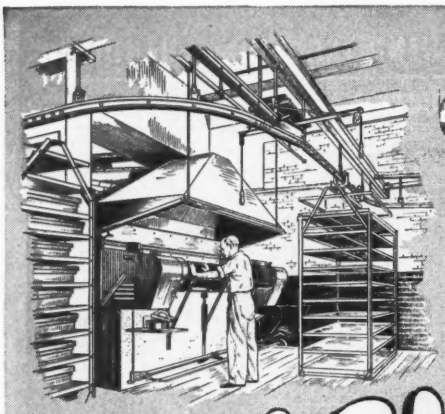
Planned production depends largely for its success on efficient materials *handling*. A handling operation starts each job, moves it along through processing and assembly to storage or shipment. Every other link in the chain of performance can rightfully be labeled "Handling."

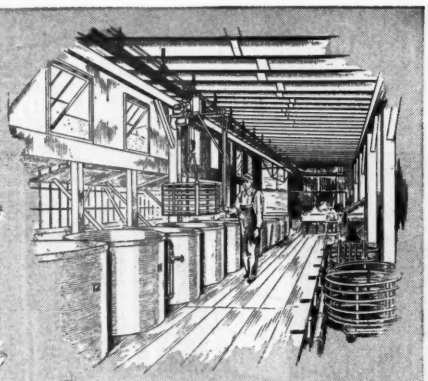
Moving materials of all sizes, shapes and weights is a continuous process today. Modern, mechanized Towmotor brings a real solution to hundreds of handling problems. Mechanical help is necessary for profitable materials handling. Get the story—send for the Towmotor DATA FILE *today*.

TOWMOTOR

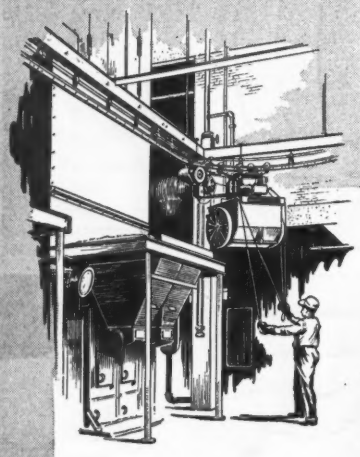
THE ONE-MAN-GANG

TOWMOTOR CORPORATION • 1222 E. 152ND STREET, CLEVELAND 10, OHIO





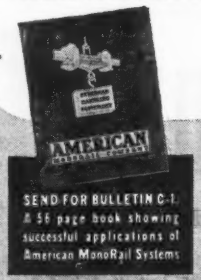
EASY HANDLING METHODS Usually Bring IMPROVED QUALITY!



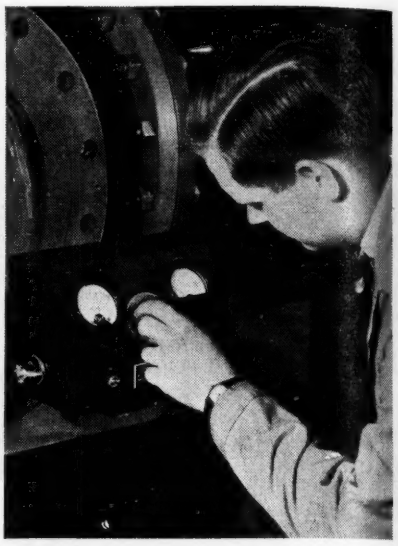
With American MonoRail Overhead Handling Equipment, less time is spent in manual operations. This means more time devoted to better processing. Systematic movement compels constant accuracy of process and lower costs.

American MonoRail provides rapid, careful transfer from one operation to the other, from cooking and cooling process to piling or cartoned goods.

THE AMERICAN MONORAIL CO.
13125 ATHENS AVENUE . . . CLEVELAND 7, OHIO



Let an American MonoRail Engineer show you "all round savings" with this equipment. Write today!



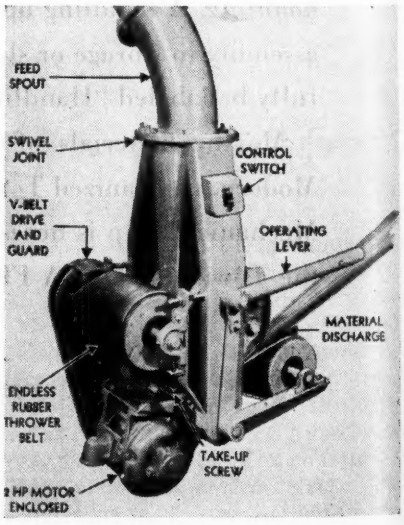
Thermocouple vacuum gage.

1,000 microns. The dial is calibrated directly in microns.

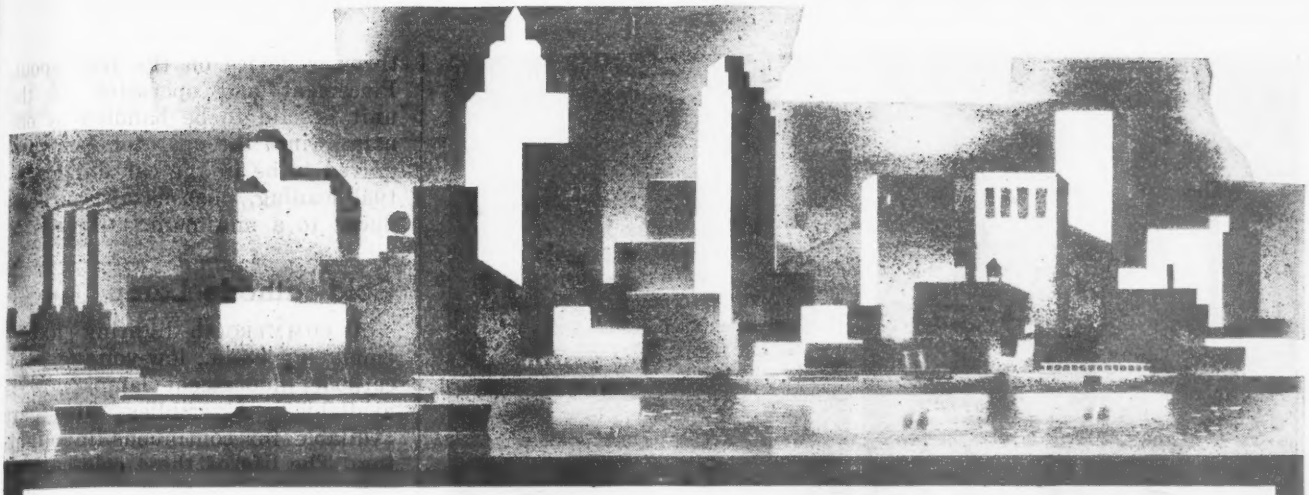
An electric heating element heats a thermocouple junction in a vacuum chamber, and the rate at which the heat escapes through the space around the thermocouple is a measure of the amount of vacuum.

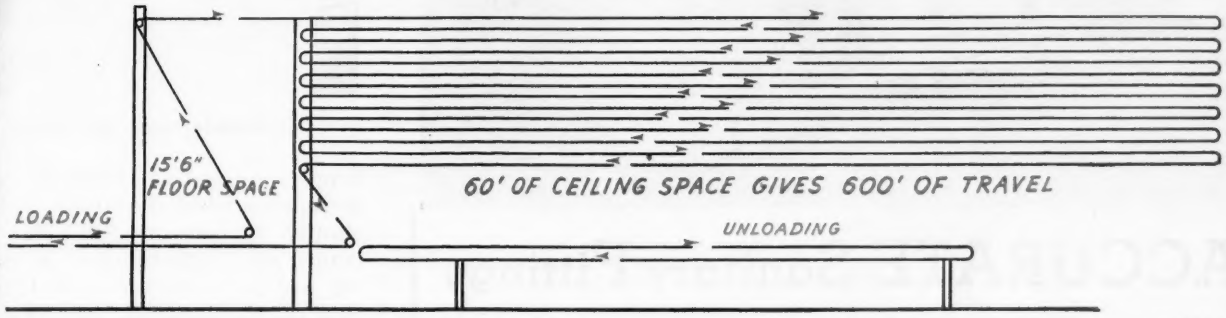
Boxcar Loader

FOR loading and trimming boxcars with loose, granular, bulk material such as grain, salt, fertilizer, and similar materials, up to 2 in. in lump size, Stephens-Adamson Mfg. Co., Aurora, Ill., announces the Swiveloader. This unit has a capacity of 40 to 80 tons per hour, depending on the type and weight per cubic foot of the material being handled. It is installed so that it can be swung into position just inside the car door. From this position all parts of the car can be loaded simply by swiveling the

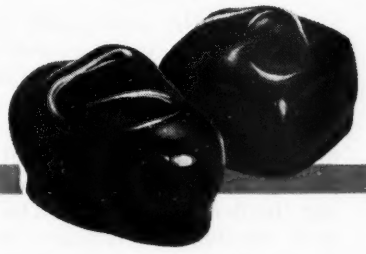


Boxcar loader.





GREER ENGINEERING INCREASES "FLOOR SPACE" OF DETROIT PLANT 40 TIMES OVER



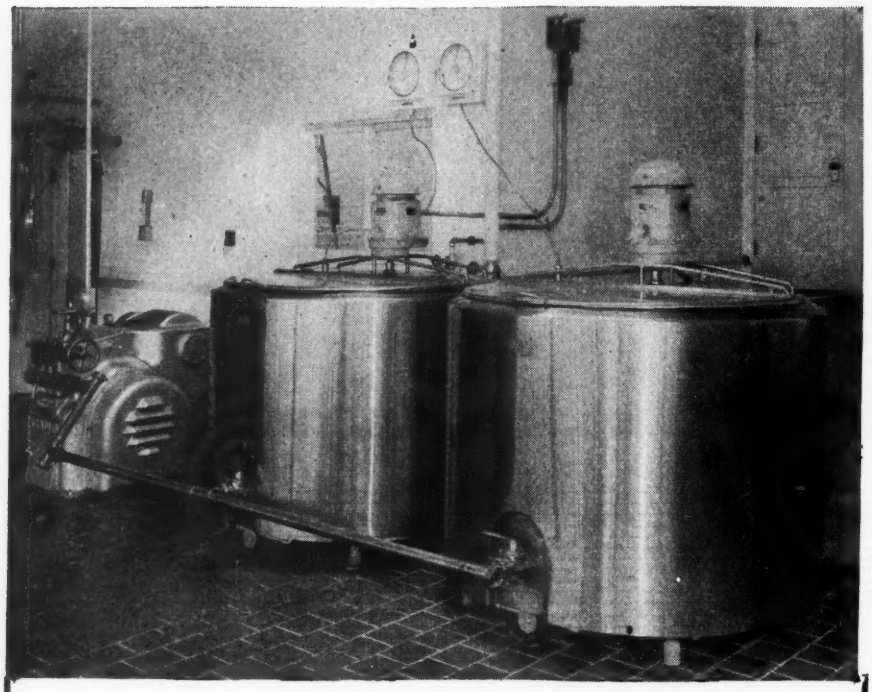
In the city world-famous for its streamlined automotive production is found the revolutionary Greer Multi-Tier Conveyor. The unique Greer principle of Conveying is here applied to the confectionery industry. In this production of large quantities of high quality chocolates, *the Greer Conveyor occupies only 15½ feet of floor space yet delivers 600 feet of cooling travel.*

While being conveyed over such a system on Greer stabilized trays, products can be suitably cooled, heated, dried, or pasteurized — with no spilling. Overhead areas are readily utilized, even to the height of two or three stories. This reduces the amount of non-productive floor space to a remarkable minimum — yet products can be conveyed as long as required before delivering them to the next operation. The Greer Multi-Tier Conveyor can be automatically loaded and unloaded. It has been adapted with outstanding success to such products as candy, crackers, cookies, bread, fruit, shoe paste, and for curing the rubber deposit in preserve jar covers.

If you are crowded for floor space or are laying out a new plant for peak efficiency, write immediately for free Folder F-3 giving detailed information about the Greer Multi-Tier Conveyor.

J. W. Greer Company
119 Windsor Street,
Cambridge 39, Mass.

MAKERS OF FAMOUS **GREER** MULTI-TIER CONVEYORS



ACCURATE Sanitary Fittings

Milk Pasteurizers and Batch Mixing Tanks require accurate Sanitary Fittings, Valves and Tubing to avoid waste and conserve all milk for human food.

Precision accuracy to two ten-thousandths of an inch represents Tri-Clover's contribution to the war effort in the manufacture of Transfusion Valves, so necessary and vital to blood transfusion in saving American lives on all the war front.

This same skilled workmanship is utilized in the manufacture of Tri-Clover Sanitary Fittings, Valves and Tubing, the accuracy of which is vitally essential in milk and dairy plants in conserving all of America's Number One Food in wartime.

When you order Sanitary Fittings and Valves specify TRI-CLOVER—the name is stamped on each one for your protection—the Fittings and Valves so extensively used in America's dairy and food processing industries. Write for our Catalog.

THE *Complete Line*

1. Trialloy (Cupro Nickel) Sanitary Fittings
2. Fabricated Stainless Steel Sanitary Fittings
3. Pumps (Centrifugal—non-agitating) Trialloy and Stainless Steel
4. Custom Fabrication
5. Sediment Testers
6. Line Filters

Standardized Accuracy and Interchangeability are YOUR Tri-Clover Guarantee.

ARMY E NAVY

TRI-CLOVER MACHINE CO.

2813 60th Street

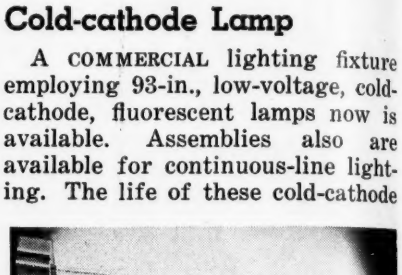
KENOSHA, WISCONSIN

Try TRI-CLOVER "THE *Complete* LINE"

thrower device on the feed spout. Placement and operation of the unit is said to be handled by one man. Since the operator is not required to be in the car during actual loading, dust hazards are reduced to a minimum.

Cold-cathode Lamp

A COMMERCIAL lighting fixture employing 93-in., low-voltage, cold-cathode, fluorescent lamps now is available. Assemblies also are available for continuous-line lighting. The life of these cold-cathode



Cold-cathode lamps and fixture.

lamps is placed at 10,000 hours or more, even when the lamps are constantly turned on and off. The lamps are instantaneous in starting and do not flicker, it is claimed. General Luminescent Corp., 638 So. Federal St., Chicago 5, Ill., is the manufacturer.

Wing Stripper

IN A recently announced poultry wing stripper, the rolls and grooves are so arranged that the machine develops a marcelling action. This action is said to withdraw the quills evenly and completely without mangling or tearing the flesh of the bird. The stripping mechanism consists of two power-driven rolls, each having a series of precision machined horizontal grooves. The manufacturer, Engineering Products Co., 3129 Western Ave., Seattle, Wash., states that the unit works smoothly and quietly.

Wing stripper.

CATALOGS, BULLETINS

FOOD PLANT EQUIPMENT

Protected Motor—Described in a 4-page bulletin is a new type of protected motor said to provide protection against many of the more common hazards encountered in operation. A cutaway view of the motor is included to show how this is accomplished. The bulletin has just been published by the Crocker-Wheeler Division of Joshua Hendy Iron Works at Ampere, N. J.

Emulsifiers—An unusual 60-page catalog covering emulsifiers, emulsions and emulsification has just been issued by the Emulsol Corp., Chicago, Ill. It tabulates the numerous products' physical and chemical properties. Excerpts are included from the Federal Food and Drug and Cosmetic Act and from the U. S. Insecticide Act.

Vacuum Evaporation—Installations of various types of glass-lined steel and stainless-steel vacuum evaporators built for the food industries are illustrated in a 4-page bulletin No. 832 issued by Pfaudler Co., 89 East Ave., Rochester 4, N. Y.

Proportioning Pumps—Wilson Chemical Feeders, Inc., 207 Clinton St., Buffalo 4, N. Y., has prepared a 4-page bulletin describing and illustrating the various models of its line of positive-displacement proportioning pumps.

Filter Presses—T. Shriver & Co., Inc., Harrison, N. J., has brought out a new 20-page catalog covering numerous types of filter presses, together with engineering data and descriptions and a resume of outstanding features.

Bag Closing—Just out is a 12-page bulletin No. 200 by Union Special Machine Co., 400 N. Franklin St., Chicago 10, describing machines for producing sewed closures on all sizes of paper and fabric bags.

Air Power—Nearly 70 photographs of air-operated equipment at work appear in a 24-page booklet by Ingersoll-Rand Co., 11 Broadway, New York 4. Three pages show air-cooled compressors. Two pages give a quick summary of the larger compressors and blowers.

Improved Stoker—A 20-page booklet with detailed operating views and drawings of improved features said to increase the efficiency of the Taylor Multiple Retort Underfeed Stoker has been issued by American Engineering Co., Philadelphia 25, Pa. This catalog covers the simplified construction, installation, operation and maintenance of the stoker.

Rubber-tired Wheel—A new tire material for truck wheels that is claimed to be tough, yet resilient and easy rolling, is described in a bulletin by Divine Brothers Co., Utica 1, N. Y. The manufacturers state that this material has more than doubled the low capacity of the regular rubber-tired wheel. The body of the wheel on which this tire is mounted is a rugged, one-piece, semisteel casting.

Equipment House Organ—Worthite News is a new periodical introduced by Worthington Pump & Machinery Corp., Harrison, N. J. It illustrates unusual applications of the company's equipment. Also from Worthington are Bulletin C-1100-B 7 on coolers for mechanical refrigeration, Bulletin C-1100-B 8 covering absorption refrigerating machines, and a pinup card giving "pointers on steam pump maintenance."

PLANT SUPPLIES

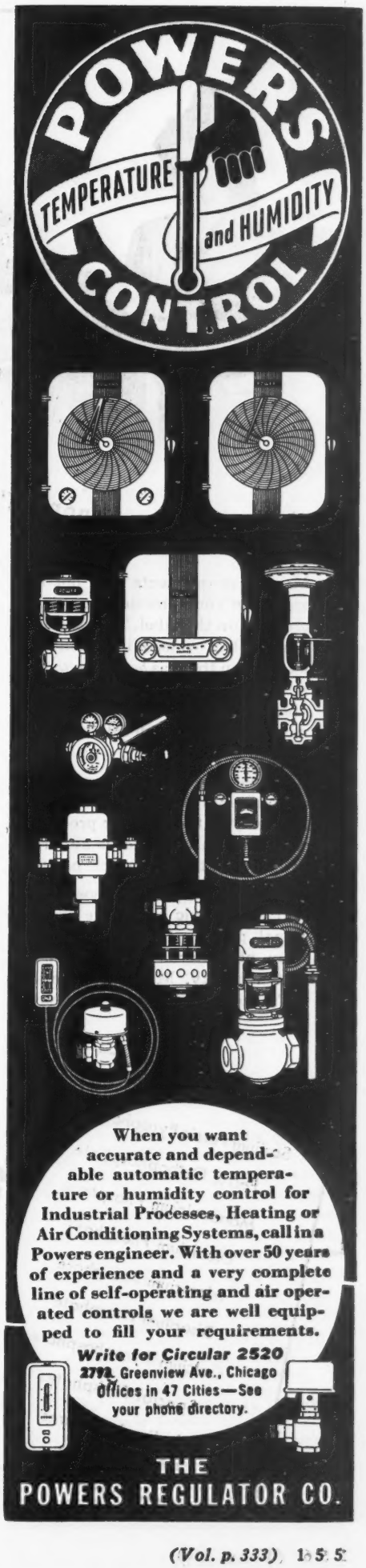
Leather Belting Manual—Offering general data, charts and specifications on leather belting is a new 56-page manual distributed by Graton & Knight Co., 356 Franklin St., Worcester 4, Mass. This manual is well illustrated and contains many tables, enabling one to figure automatic tension drives, belt prices and other information on power-transmission.

Insulation—In a 12-page booklet is described a number of forms and shapes of Fiberglas insulating material. Chemical and physical properties are given. The booklet is well illustrated with photographs of actual applications of this versatile material. Copies may be obtained from the Owens-Corning Fiberglas Corp., Toledo 1, Ohio.

Acid-proof Brick—A hard-wearing acid-proof brick floor for the food industries is described in a new 16-page brochure by Belden Brick Co., Canton, Ohio. The brochure gives instructions for installation with an acid-proof cement said to be as highly resistant to bacteria, heat, chemicals and abrasion attack as the hard, fired, red-shale bricks themselves. The bricks come smooth or nonskid.

Vacuum Cleaner—Illustrating a number of industrial vacuum cleaners is a new folder issued by Invincible Vacuum Cleaner Mfg. Co., Dover, Ohio. The folder describes the many industrial applications for plant and office.

Valves and Controls—Describing a complete line of automatic valves and pressure controls is a new 28-page catalog issued by A. W. Cash Valve Manufacturing Co. of Decatur, Ill.


POWERS
TEMPERATURE and HUMIDITY
CONTROL
When you want accurate and dependable automatic temperature or humidity control for Industrial Processes, Heating or Air Conditioning Systems, call in a Powers engineer. With over 50 years of experience and a very complete line of self-operating and air operated controls we are well equipped to fill your requirements.
Write for Circular 2520
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Offices in 47 Cities—See your phone directory.
THE
POWERS REGULATOR CO.

better health...

YOUR PRODUCT'S UNSEEN INGREDIENT

Mineral supplements may not be visible *in* your product, but they *are* seen on the label. The modern homemaker, versed in nutrition, looks upon them as *better health* for her family. Hence, fortification of your product with mineral supplements often is the deciding factor in retail sales.

Monsanto food-grade mineral supplements offer you the dependable way to fortify your products with calcium, phosphorus and iron ... all essential to better health.

Monsanto food-grade phosphates and phosphoric acid have exceptional purity. They are derived from phosphorus of better than 99.9% purity. Monsanto, America's leading producer of elemental phosphorus, extracts the product from ore taken from its own mines. Hence, the Monsanto mineral supplements you use have *quality*, controlled through every step from mines through manufacturing.

We shall be pleased to send you technical information to help with your food fortification problems... and to supply samples of our products for your testing and experimentation. Please contact the nearest district office or write: MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second St., St. Louis 4, Missouri.

District Offices: New York, Chicago, Boston, Detroit, Charlotte, Cincinnati, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

Sodium Ferric Pyrophosphate
Ferric Orthophosphate
Monocalcium Phosphate
Dicalcium Phosphate
Tricalcium Phosphate
Disodium Phosphate
Calcium Pyrophosphate
Special Phosphates
Iodized Mixtures

MONSANTO FOOD-GRADE MINERAL SUPPLEMENTS

MONSANTO CHEMICALS

SERVING INDUSTRY...WHICH SERVES MANKIND

CONTROL EQUIPMENT

Electric Control—Just from the printer is a 25-page catalog issued by Leeds & Northrup, 4934 Stenton Ave., Philadelphia 44, Pa. In this bulletin are described control systems designed to regulate electric input so precisely that temperature is held steadily as specified. Schematic illustrations show how control action is obtained by regulating the proportion of time during which current is "full on" and "full off." Installation photos show the control system in use in representative plants.

Time-schedule Controller—A new 8-page bulletin No. 98165 has been issued by the Taylor Instrument Cos., Rochester 1, N. Y. It is illustrated liberally with photographs of time-schedule controller applications.

Laboratory Equipment — Describing an extensive line of laboratory and testing equipment is a new 64-page catalog issued by Scientific Glass Apparatus Co., 49 Ackerman St., Bloomfield, N. J.

Valves and Controls—Describing a complete line of automatic valves and pressure controls is a new 28-page catalog issued by A. W. Cash Valve Manufacturing Co. of Decatur, Ill.

MATERIALS HANDLING

Conveyors — Graphically illustrated with photographs of actual installations and with diagramatic drawings is a new 26-page catalog issued by Standard Conveyor Co., North St. Paul, Minn. In addition to the photographic illustrations is a section indexing 46 different industries and also the various conveyors by types. In this section are found sketches of the types, how they are to be used, and a table for selecting the conveyor best suited for a given job.

Materials Handling—Printed in three colors and with a special file tab is the new 76-page catalog No. 22 issued by the Lewis-Shepard Products, Inc., 300 Walnut St., Watertown 72, Mass. The catalog is illustrated quite profusely. In it are special sections on lift trucks, skid platforms, fork trucks, stackers and other materials handling equipment.

Fluid Handling—Fluid-handling equipment is described in catalog No. 45 published by J. A. Zurn Mfg. Co., Erie, Pa. This catalog features a complete line of suction and pressure line strainers. Other products described are interceptors for grease, wax, fats and oils.

BOOKS

Food Laws

FOOD REGULATION AND COMPLIANCE, Vol. I. By Arthur D. Herrick. Published by Revere Publishing Co., 32 Broadway, New York 4, N. Y., 1944. 646 pages; 6⅛x9¼ in.; cloth. Price, $10.

Food laws and regulations may not be a new development, but their extensive application to every phase of the food industry has certainly found tremendous expansion during recent years. This book brings together this network of laws and regulations, and in nonlegal terms attempts to analyze, explain and interpret their application.

It would be obviously impossible to provide a specific answer to each legal question that might arise. The author does, however, present the principles underlying the formulation of the numerous statutory requirements, and he offers ample illustrations. The packer, processor and distributor, therefore may apply them to their particular products.

The work has been developed generally around the framework of the Federal Food, Drug and Cosmetic Act. It was written in close consultation with the various government agencies concerned. The subjects covered include current legislation, labeling, packaging, food and grade standards and special dietary food regulations.

Terms Defined

DICTIONARY OF ENGINEERING AND MACHINE SHOP TERMS. By A. H. Sandy. Published by Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y., 1944. 153 pages; 5½x8¾ in.; cloth. Price, $2.75.

Engineering terms often rise to plague both the beginner and the experienced worker in the food industry. This little dictionary, defining close to 1,500 terms, is a handy book to be kept in a convenient place in the plant.

The Economic Web

AMERICA'S NEW OPPORTUNITIES IN WORLD TRADE. By The Committee on International Policy. Published by the National Planning Association, 800 Twenty-first St., N. W., Washington, D. C. November, 1944. 79 pages; 5x7¾ in.; paper. Price, 50 cents.

Here is a clearly written report outlining the place in which the United States finds itself in today's world economic structure. It points out the tremendous implications involved in this country's altered situation during the past 30 years—from a debtor nation to a leading creditor nation and from there on to virtually the creditor nation of the world.

These enormous problems, in which the food industry has one of the heaviest stakes, will require deep understanding by a great many individuals, if they are to be solved. This report offers a lucid approach both to the problems and to at least some of their solutions—but neither the problems nor the solutions are those of 30 years ago.

British Index

INDEX TO THE LITERATURE OF FOOD INVESTIGATION. Vol. 15, No. 2, September, 1943. By Agnes Elizabeth Glennie and Janet Lang Hall. Published in England. For sale through the British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 158 pages; 6x9½ in.; paper. Price, $1.35.

Still going strong despite the War's impact on England, this index to the food literature of the world makes another late, but welcome, appearance.

GOVERNMENT PUBLICATIONS

DROUGHT IN THE UNITED STATES ANALYZED BY MEANS OF THE THEORY OF PROBABILITY. By George Blumenstock, Jr. Department of Agriculture, Technical Bulletin No. 819. Available from Superintendent of Documents, Washington 25, D. C. Price, 15 cents. This is helpful in attempting to anticipate crop prospects.

MARKET DISEASES OF FRUITS AND VEGETABLES. Department of Agriculture, Miscellaneous Publication 541. Available from Superintendent of Documents, Washington 25, D. C. Price, 40 cents. Elaborately illustrated by colored plates.

LIST OF BULLETINS OF THE AGRICULTURAL EXPERIMENT STATIONS FOR THE CALENDAR YEARS 1941 AND 1942. Department of Agriculture, Bibliograpical Bulletin 4. Available from Superintendent of Documents, Washington 25, D. C. Price, 25 cents. An elaborate bibliography.

SOLID CARBON DIOXIDE (DRY ICE). Bureau of Standards, Letter Circular LC-763. Free. A brief description of properties and information of general interest.

CONTAINERS. Department of Commerce, Industrial Series No. 13. Free. This is a statistical handbook covering container usage by various divisions of industry.

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Recent research shows that copper and iron, even in minute traces, are "bad actors." In the manufacture of shortening, they are eliminated to increase rancidity resistance of fats and oils. They affect stability of dairy, bakery, and meat products—and practically any food that contains the slightest traces of fats or volatile flavors easily oxidized.

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PATENTS

Unstuffed Sausage Casings Treated With Small Quantity of Proteolytic Enzyme to Give Casing Tenderized Properties After Stuffing and Cooking Without Substantial Reduction in Tensile Strength—Gustav Redemske, to Armour & Co., Chicago, Ill. No. 2,365,728. Dec. 26, 1944.

Flour Given Gas Bleaching in Continuous Manner—Hugh McDonald, to Pillsbury Flour Mills Co., Minneapolis, Minn. No. 2,365,767. Dec. 26, 1944.

Corn Flakes Treated and Agitated Without Mechanical Handling by Current of Circulated Air Directed to Move to and from Treating Machine and Through Each Batch of Flakes Independent of Other Batches—Donald E. Marshall, to Kellogg Co., Battle Creek, Mich. No. 2,365,769. Dec. 26, 1944.

Sugar Converted Into Iodo-Sugar Derivatives by Substitution of at Least One Primary Hydroxyl Group by At Least One Iodine Atom—Albert L. Raymond, Northfield, and Elmer F. Schroeder, Chicago, Ill., to G. D. Searle & Co., Skokie, Ill. Nos. 2,365,776 and 2,365,777. Dec. 26, 1944.

Farinaceous Material Mixed With 50 Percent of Its Weight of Water, Progressively Gelatinized and Liquefied by Heat and Amylase Action to Give Sirupy Concentrate of Liquefied Starch—Christopher Henry Warburton, Carlisle, England. No. 2,365,788. Dec. 26, 1944.

Fruit Juices Extracted in Machine Equipped With Rotating Reamer and Fruit-gripping Hand Operating on Axes at Right Angles to Each Other—Charles Zienus Monroe, Detroit, Mich., to Sealdsweet Sales Association, Tampa, Fla. No. 2,365,832. Dec. 26, 1944.

Partial Drying Step in Food Dehydration Carried Out in Continuous Manner Within Chamber Equipped With Continuously Moving Conveyor Operating to Prevent Inflow of Air While in Contact With Superheated Steam Flowing Continuously at High Velocity—Douglas M. McBean, Rochester, N. Y. No. 2,365,890. Dec. 26, 1944.

Vitamin C Content Preserved in Fresh Foods by Heating and Agitating Material Under Vacuum While Exposed to Catalytic Action of Water-insoluble Metallic Oxide and Subjected to Electric Current—Ralph S. Willard, Glendale, Calif., to Sunlite Fruit Juices, Ltd., Hollywood, Calif. No. 2,365,924. Dec. 26, 1944.

Chewing Gum Base Made by Condensing Aliphatic Polyamine With Polycarboxylic Acid—Frank B. Root, Montclair, N. J., to Ellis-Foster Co. No. 2,366,128. Dec. 26, 1944.

Swiss Steaks Canned—August Barth Chicago, Ill., to Danbar Packing Co. No. 2,366,169. Jan. 2, 1945.

Canned Chicken Noodle Soup Made in Continuous Manner From Formation of Noodle Dough to Sterilization of Scalded Can—Philip Walburn Souder, Morristown, N. J., to Campbell Soup Co. No. 2,366,366. Jan. 2, 1945.

Cheese Curd Shaped Into Cylindrical Form During Draining Operation—Thorkild Petersen, Elgin, Ill., to Pure Milk Cheese Co. No. 2,366,553. Jan. 2, 1945.

Fruit and Vegetable Juices Containing Degraded Pectins Concentrated, Adjusted for Acidity, Pressed Into Tablet Form and Dehydrated to Give Hard Consistency at Room Temperature—John A. Bruce, to Bruce's Juices, Inc., Tampa, Fla. No. 2,366,591. Jan. 2, 1945.

Chewing Gum Base Made to Contain Up To 40 Percent of Polyvinyl Alkyl Ether—Gilbert B. Mustin, Lansdowne, Pa., to Frank H. Fleer Corp., Philadelphia, Pa. No. 2,366,672. Jan. 2, 1945.

Sausages Packaged in Casing Made of Fabric Having at Least One Longitudinal Seam Consisting of Elastic Thread to Permit Stretching in Transverse Direction—Lloyd E. Dimond, Portsmouth, Va. No. 2,366,710. Jan. 9, 1945.

Cereal Grains Freed From Epidermal Layer of Bran Coat Without Material Change in Natural Grain Conformation—Theodore Earle, Pacific Palisades, Calif. No. 2,366,711. Jan. 9, 1945.

Food Packaged in Tin-coated Metal Container Lined With Noncrocking Plastic Containing Flake Aluminum—Morris G. Gardner, Orange, N. J., to Pittsburgh Plate Glass Co., Allegheny County, Pa. No. 2,366,850. Jan. 9, 1945.

Leavening Constituent Made to Consist of Calcium Acid Pyrophosphate and Alkali Metal Hexametaphosphate—Rudolph J. Hurka, Clearwater, Fla., to Monsanto Chemical Co. No. 2,366,857. Jan. 9, 1945.

Cereal Grains Hydrolyzed to Give at Least 50 Percent of Nitrogen as Amino Acids of Arginine, Cystine and Tyrosine Group—Arnold K. Balls, Washington, D. C., Walter S. Hale, Alexandria, Va., and Thomas H. Harris, Washington, D. C., to Secretary of Agriculture, U. S. A. No. 2,366,952. Jan. 9, 1945.

Zein and Glycol Used as Constituents of Quick-drying Printing Ink—John W. Kroeger and Harry F. O'Conner, Philadelphia, Pa., to Frederick H. Levey Co., Inc., New York, N. Y. No. 2,366,970. Jan. 9, 1945.

Glycerol Purified by Distillation From Fermented Carbohydrate Solution—James S. Wallerstein and Ralph Thomas Alba, New York, N. Y., and Eduard Farber, New Haven, Conn., to Overly Bio-Chemical Research Foundation, Inc., New York, N. Y. No. 2,366,990. Jan. 9, 1945.

Citrus Juice Heat Treated at 200 Deg. F. for 5 to 10 Min., Mixed with Corn Sirup Solids and Spray Dried to Give Enzyme-free Citrus Juice Powder—Herbert T. Leo and Clarence C. Taylor, to Mutual Citrus Products Co., Anaheim, Calif. No. 2,367,131. Jan. 9, 1945.

Dry Purified Pectin Prepared From Acid Extract of Fruit Material—Herbert T. Leo, Clarence C. Taylor and John W. Lindsey, to Mutual Citrus Products Co., Anaheim, Calif. No. 2,367,132. Jan. 9, 1945.

Citrus Flavoring Oil Dispersed in Acidified Gelatine Solution and Dried Into Gelatine-like Form to Conserve Flavoring Value and to Retard Development of Terpene Flavor—Chester H. Epstein, Highland Park and Nathan R. Gotthoffer, Grayslake, Ill., to Grayslake Gelatin Co., Grayslake, Ill. No. 2,367,279. Jan. 16, 1945.

Canadian Patents

Butter Dehydrated to 5 Percent Moisture Content by Melting and Heating to Not Higher Than 70 Deg. C. Under Vacuum—Jakob L. Jakobsen, to General Mills, Inc., Minneapolis, Minn. No. 424,676. Dec. 26, 1944.

Heat-coagulated Protein Constituents of Whey Homogenized With Portion of Whey Liquid to Give Milk-like Product—Daniel Murray Smillie and John Wight, Auchincruive, Ayrshire, Scotland, to West of Scotland Agricultural College, Glasgow, Scotland. No. 424,767. Dec. 26, 1944.

Food Liquids, Containing Solids, Transferred by Pump Action—David William Bingham, Brighton, Victoria, Australia. No. 424,782. Jan. 2, 1945.

Peaches Stoned by Mechanical Means—Sarah Caroline Farmer, Ellensburg, Wash. No. 424,786. Jan. 2, 1945.

Precooked Food in Wafer Form Made to Have Binder Constituent Containing Vitamin Component Stabilized Against Deterioration on Exposure to Atmosphere—Elmer G. Gustavson, to Quaker Oats Co., Chicago, Ill. No. 424,860. Jan. 2, 1945.

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

FRUIT PRODUCTS

Pectase Solutions

THE key to obtaining pectase in active form from plant tissues is pH. At pH values of 3 to 4, the pectase is adsorbed on the cellulose and pulp of the plant, at pH 5 to 6.5 it is desorbed and goes into the serum portion. Thus by adjusting the acidity almost all the pectase can be obtained in a clear serum filtrate or in the pulpy residue of tomato, as desired. It is collected in the serum for immediate use in demethoxylating pectin. It is held on the pulp, which is then dried by use of alcohol or acetone (100 percent) or in a current of air at temperatures below 95 to 104 deg. F., when it is to be stored for later use.

The pectase can be desorbed from the dry tissue by suspending in a suitable volume of water, then adjusting the pH to 6. Alkaline phosphate solution is recommended to adjust the pH, as the presence of salts is beneficial.

Eggplant is another rich source of pectase.

This pectase, free from pectinase, is particularly suitable for controlled removal of methoxyl from pectin preparations, to yield highly polymerized pectinic acids of predetermined methoxy content, according to the method described in another patent issued at the same time.

Digest from U. S. Patent 2,358,429, issued Sept. 19, 1944, to J. J. Willaman and C. H. Hills, and 2,358,430, issued the same day to Willaman, H. H. Mottern, Hills and G. L. Baker, both assigned to the Secretary of Agriculture.

FATS AND OILS

Synergists

STABILIZATION of fats by various antioxidants alone and in combination has been subjected to enough investigation so that a summation is in order:

If a fat naturally has an optimum content of some phenolic antioxidant (as, for instance, tocopherols in vegetable oils), the addition of further amounts of similar reagents may be useless. Excess of a phenolic compound may even be detrimental, where it is itself vulnerable to oxidation, as the quality of the fat may be depreciated by the oxidation products of the phenolic inhibitors.

Such fats can be benefited by the addition of synergistic compounds which prolong the action of the phenolic stabilizer and make a little of it go farther. Citric, oxalic, maleic and other di- and polybasic organic acids, ascorbic acid, cephalin and certain inorganic acids, notably sulphuric and phosphoric, are known to be effective.

Animal fats being devoid of phenolic inhibitors, some must be added, but the addition should not be overdone. Here, too, best results are obtained with a phenolic inhibitor plus an acid synergist. Gallic acid is effective in animal fats because it is both an acid of the necessary configuration and a phenol.

Digest from "Anti-oxidants and Synergists," by H. A. Mattill, Oil & Soap, vol. 22, 1-3, January, 1945.

CEREAL PRODUCTS

Enrichment

A PROCESS PATENT has been issued on work done some years ago in England in which the vitamin content of the original grain is returned to the final edible portion through steeping. It is stated that within the range of 18 to 38 percent moisture there is a greater tendency for the endosperm to absorb water, and advantage is taken of this to cause the vitamin-bearing solution to penetrate into the grains.

According to the patent disclosure, the grain is subjected to a high vacuum to eliminate air, hot water is admitted until the grain is covered, and then pressure is applied. Normal operating conditions are water below 142 deg. F., pressures up to 100 to 125 p.s.i. and 15 to 30 minutes steeping under pressure. Steep water is withdrawn and the grain is vacuum dried. During drying, when the grain is at 104 to 142 deg. F., it may be sprayed again with the vitamin solution, then drying is continued to a moisture content suitable for milling.

For reuse, the steep water withdrawn should be held at a pH of about 5. Vitamins from other sources may be added to the treating solution.

The process may also be applied to partly milled grains, the enriching solution then being obtained by steeping the bran and offals.

Mention is made of white rice, pearl barley, corn grits and semolina, as well as wheat flour.

Digest from U. S. Patent 2,358,250,, issued September 12, 1944, to F. H. Rogers and E. G. Huzenlaub.

FOOD CHEMISTRY

Wheat Gluten Gel

INTRODUCTION of sulphate groups into a protein has been accomplished, with the production of a gel-forming material of interesting properties. The only protein so far found which responds in this way is wheat gluten.

The sodium gluten sulphate is a cream colored solid which absorbs from 100 to 300 times its weight of water to form an odorless, tasteless and almost water clear gel. These gels are liquefied by trypsin, but the action of pepsin and papain varies widely in individual cases. Strong electrolytes reduce gel volume, nonelectrolytes have no effect on this property. Tests on experimental animals have shown no toxic effect.

Gluten sulphate is superior to gum tragacanth and gum karaya for emulsifying olive and cottonseed oils and, since the gels are not affected by freezing, it is suggested for emulsifying or thickening ice cream.

Vacuum-dried wheat gluten may be suspended in a pyridine solution of chlorosulphonic acid and heated, with stirring, for 2 hours at 75 deg. C. At the end of that time the reaction mixture is poured into a mixture of sodium hydroxide and methanol. The suspension is allowed to settle, then washed repeatedly with alcohol, maintaining the pH at 7.5. This method was used for large-scale preparation. Sulphuric acid can be used, but

there were the usual difficulties entailed in handling concentrated sulphuric acid, and the product was no better, although it also had satisfactory gelling properties.

Undenatured gluten must be used. Glutenin yielded a product with high hydration capacity, gliadin gave only water-soluble products.

(It is to be remembered that agar and carageenin are naturally occurring sulphonated proteins with outstanding gelling properties.)

Digest from "Gel-forming Derivative of Wheat Gluten," by H. C. Reitz, R. E. Ferrel and H. S. Olcott, Industrial and Engineering Chemistry, vol. 36, 1149-51, December, 1944.

Glutose Identified

DURING an investigation into the unfermentable reducing substances in cane molasses, the nature of the substance designated as "glutose" has been determined. It consists of a mixture of fructopyranose anhydride and difructopyranose anhydride. This clears up another of the puzzles encountered in working with complex sugar mixtures and their derivatives.

Digest from "The Nature of Glutose," by L. Sattler and F. W. Zerban, Sugar, vol. 39, December, 1944.

FERMENTATION

Fermentation Acidity

RELATION between total acidity and pH resulting from bacterial action varies for different strains and different media. Yet the course of an experimental or industrial fermentation is frequently expressed in terms of one or the other, not both.

Comparison of curves for final acidity vs. pH for several organisms in milk and in broth shows that the apparent discrepancies are due to the relative amount of the different acids formed, and to the difference in buffering action of the media.

Lactic acid is more highly dissociated than acetic, the respective constants being 1.4×10^{-4} and 1.8×10^{-5}. There is a greater variation in the relationship of pH and acidity in the earlier stages of the fermentation, indicating greater variability in the process during the early stages or the presence of the relatively undissociated carbonic acid. Lactic acid predominates over acetic in the end products of lactic bacteria fermentation of the hexoses and disaccharides. The pentose sugars, arabinose and xylose, yield about equal molar

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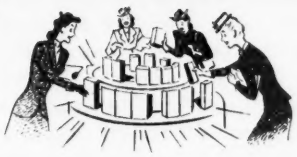

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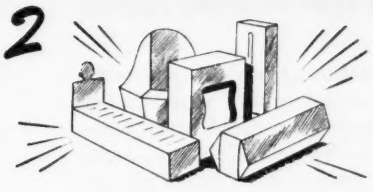

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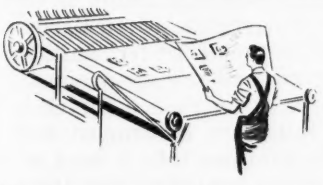

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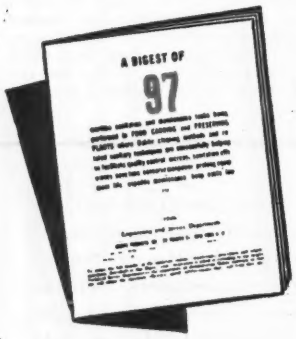

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quantities of the two acids. Thus the total acidity of the latter tends to be greater with less change in pH.

The final hydrogen ion concentration attained with any one strain will depend on the buffer action of the medium and also on the inhibiting effect of the products of reaction, which may stop the reaction before the normal end point is reached. Undissociated lactic and acetic acids in the presence of free H ions may have such an effect.

Digest from "The Cause of Variation in the Relationship Between Titratable Acidity and Hydrogen Ion Concentration Among Lactic Acid Bacteria," by C. S. Pederson and J. V. Bagg, Journal of Bacteriology, vol. 48, 559-66, November, 1944.

ENGINEERING

Wort Decantation

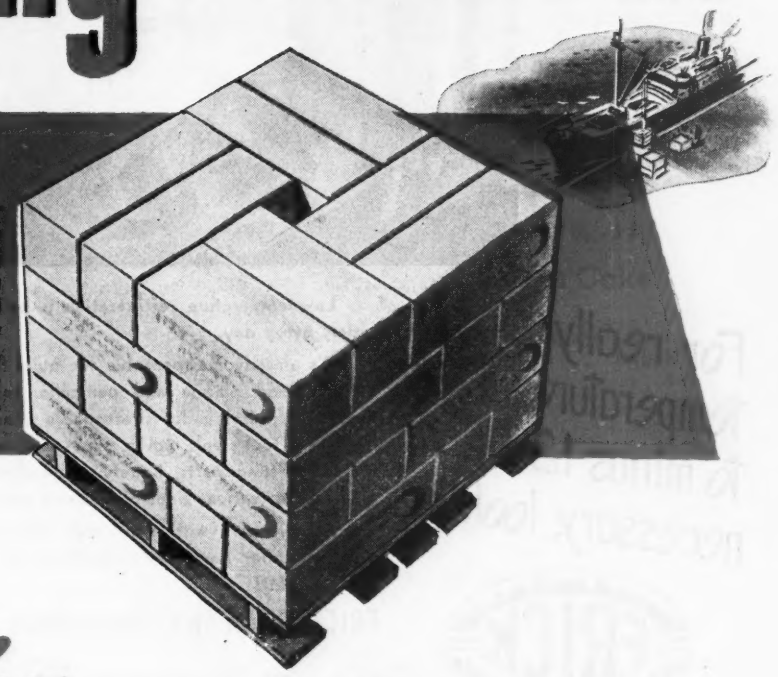
AT one stage in his process, after hop boiling is completed, the brewer is confronted with the problem of removing from the wort both a flocculent precipitate which forms while the mixture is hot and colloidal particles which are precipitated out when the wort cools. The latter must be removed, as this material adversely affects the taste and clarity of the final brew. In addition, the wort must be aerated while hot, to remove certain vapors or odors, and it is desirable to continue aeration during cooling in order to assure sufficient oxygen for high yeast activity.

The usual practice is to remove the flocculent hot-break precipitate, then cool and remove the colloidal precipitate, which is slow to settle. Apparatus described in a patent now issued is so designed that the flocculent hot precipitate is kept in suspension until after the wort is cooled, when it is allowed to settle, carrying down with it the colloidal particles precipitated out during cooling.

In order to do this, the equipment is so arranged that flow of the precipitate-bearing liquid is over vertical surfaces, particularly in the aerator and cooler units. Small orifices and jets are avoided, so that there is no chance for clogging.

Hot wort is pumped through a hop strainer into a wort receiving tank so designed that the part of the flocculent hot-break separating as heavy sludge can be drawn off from the bottom while the main portion of the liquid, with a considerable proportion of the hot-break precipitate, is withdrawn through a vertical pipe extending

Palletizing WITH ADHESIVES



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SAVES	PREVENTS
Steel	Break-up
Labor	Damage
Time	Pilferage
Containers	

Now SPEEDS MULTIPLE-UNIT WAR DELIVERIES

All war contractors—large or small—can now make palletized shipments *whether or not* they are equipped with special tools for steel strapping and mechanical handling equipment.

A fast-setting, mold-proof, brush applied adhesive . . . National's PALLET ADHESIVE #4 . . . permits unit loading either inside the plant at the delivery conveyor — *or directly on pallets in the freight car or delivery truck.*

Domestic shipments to prime contractors equipped with fork-lift trucks — or to the home depots of the Services *need no further binding.*

Overseas shipments can be 3-strapped (instead of 6-strapped) by the Services at ports of embarkation or by specially equipped contractors.

Government specifications calling for palletized units are rapidly being extended to all contractors. The advantages of palletizing with adhesives are many: Unit loading saves time, labor, critical metal and handling equipment. Rehandling caused by load break-up is eliminated. Damage in transit is lessened. Pilfering is discouraged. And savings in container costs are made possible.

Further information is available NOW! Address: National Adhesives, 270 Madison Avenue, New York 16; 3641 So. Washtenaw Avenue, Chicago 32; 735 Battery Street, San Francisco 11, and other principal cities. In Canada: Meredith, Simmons & Company, Ltd., Toronto and Montreal.

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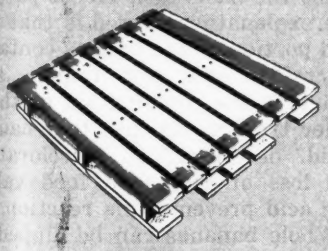
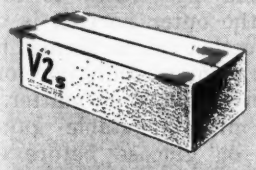


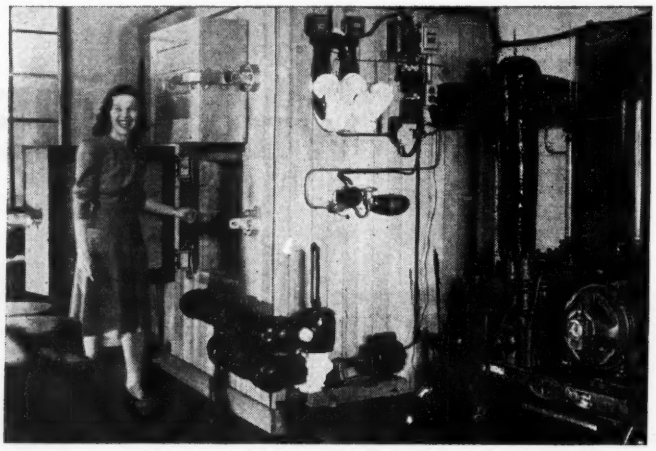
PALLET ADHESIVE # 4 is applied by brush around the perimeter of the pallet. Then the first layer of cartons is placed in position.



An L-shaped strip of adhesive is then applied to the top corners of each carton — to lock the succeeding layers in place.

National ADHESIVES

EVERY TYPE OF ADHESIVE FOR EVERY TYPE OF ADHESION



Frick Low - temperature Test Plant at one of the State Agricultural Experiment Stations.

For really COLD temperatures, down to minus 120° F. if necessary, look to

FRICK

Low-temperature refrigeration is being used more widely every day.

It's already indispensable for quick-freezing foods, drying blood plasma and penicillin, testing engines, guns, and radios under stratosphere conditions, superhardening tool steels, aging gages and castings, shrinking tight-fitting parts, liquefying gasoline and natural gas, and for various kinds of research and process work.

As pioneers with very wide experience in this field, we offer our services to those in need of cold that's COLD!

FRICK COMPANY, Waynesboro, Pa., U.S.A.

Refrigeration

MAKING FINE PUMPS FOR OVER 25 YEARS

Frederick Pumps have long been known to the Food industry by reputation, and numerous firms are well acquainted with Frederick's engineering skill as applied to pumps through years of experience with them in their own plants.

Built specifically for the Food industry from a basic design, Frederick Pumps meet the operating conditions of that industry and are GUARANTEED to do the job for which they are sold.

THE Frederick IRON & STEEL CO. Frederick, Maryland

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part way up the tank. The heavy sludge flows by gravity through a large-diameter cooling coil directly into a sludge separating tank.

The main portion of the wort and precipitate passes through a balance tank to an aerator unit. In this the hot wort is delivered through a horizontal pipe slotted at the top to a vertical flow plate. The flow plate may have horizontal corrugations. Sterile warm air flows upward over the continuous wort film. Wort at the bottom of the plate is still above 150 deg. F. Aerated wort passes through a receiving tank designed to minimize foaming and into a vertical plate cooler, where cool sterile air passes up over the flowing wort film on the cooling plates. The cooled wort passes through a pipe to the settling tank, which also collects the heavy sludge removed from the wort receiving tank. The flocculent precipitate with adsorbed colloidal cold break particles is then readily filterable.

Digest from U. S. Patent 2,359,876, issued October 10, 1944, to F. H. Schwaiger and assigned to Anheuser-Busch, Inc., St. Louis, Mo.

DEHYDRATION

Dried Bananas

TREATMENT with hot acid in dilute solution to prevent deterioration of bananas before and during drying forms the basis of a recent patent. The explanation offered is that the seed portion of the banana contains anacrolitic acid and tannin, and that it is the combination of these under tropical warmth that causes rapid deterioration, discoloration and loss of taste and food value. The acid prevents this reaction.

Whole bananas can be dipped in the dilute acid solution at a temperature below boiling, then removed and dried immediately. Almost any edible acid can be used. The acid penetrates to the core while the outer portion is drying. A confection can be formed by adding a coating of fruit juice or other flavoring, coloring matter, powdered milk, vegetable gums and starch or glucose before drying. The banana can also be pulped and the acid solution added. This facilitates handling the product, as the gummy and tacky consistency of the pulp is altered so that the drying is more rapid, requires less heat and yields a more acceptable product.

Digest from U. S. Patent 2,353,333, issued July 11, 1944, to S. B. Harris, Cristobal, C. Z.

FORMULAS FOR FOODS

FORMULA NO. 521

Coffee Cup Cakes

Brown sugar	5 lb. 10 oz.
Emulsifying shortening	2 lb. 8 oz.
Salt	2½ oz.
Milk Powder	7½ oz.
Eggs	3 lb.
Coffee extract*	4 lb. 2 oz.
Flour	5 lb.
Baking Powder	5 oz.
Vanilla	to flavor

Directions

Cream brown sugar, shortening, milk powder and salt on medium speed for 4 minutes, then gradually add the eggs and mix for 3 minutes. Add 1 lb. 14 oz. of the coffee extract, mixing 1 minute on low speed. Sift the flour and baking powder. Add and mix 2 minutes on low speed. Finally add the rest of the coffee extract and the vanilla, mixing for 3 minutes more.

Drop into paper-lined cupcake tins. Bake at 380 deg. F. These may be iced with vanilla cream icing, or offered plain to eat with fruit or ice cream.

*Coffee Extract

Bring 2 qt. of water to a boil, add 1 lb. coffee and heat just to the boiling point. Cover and let stand for several minutes. Strain. Add water to bring the total up to 2 qt.

Formula from Research Bakery, Armour & Co.

FORMULA NO. 522

Quince Preserves

Water	20 lb.
Prepared fruit	100 lb.
Citrus pectin, 100 grade, quick set	4 to 6 oz.
Sugar	100 lb.
Fruit acid solution	6 fl. oz.

Directions

Measure or weigh the water into the kettle and add the fruit which has been peeled, pitted and cut into even pieces. Cook until the fruit is softened but not broken. Allow temperature to fall to 160 to 180 deg. F., then add the pectin thoroughly mixed with 8 times its weight of sugar taken from the total amount required for the batch. Stir in well, then bring the mixture to a brisk boil, continuing to stir occasionally. Boil as vigorously as possible. The final temperature should be 223 deg. F. at or near sea level (11 deg. F. above the boiling point of water at the altitude of the factory is required).

Allow the batch to stand for a few minutes so that steam can escape. Draw off and fill into containers and cap while the preserve is still above 190 deg. F. If the temperature goes lower than this, the jars must be sterilized after filling and capping.

The acid is prepared by dissolving 1 lb. of citric acid or ½ lb. of tartaric acid in 1 pt. of hot water.

Formula from California Fruit Growers Exchange.

FORMULA NO. 523

Nutrition Candy Bar

Bar Core

Sugar	25 lb.
Corn sirup	25 lb.
Soya flour*	6 to 10 lb.
Sweetened condensed milk	10 lb.
Salt	8 oz.
Fondant**	35 lb.
Ground raisins	5 lb.
Soya grits	5 lb.

**Fondant

Sugar	75 lb.
Corn sirup	25 lb.
Soya flour*	7 to 12 lb.
Water	to dissolve

Coating

Corn sirup	60 lb.
Sugar	10 lb.
Soya flour*	8 to 12 lb.
Molasses	5 lb.
Sweetened condensed milk	10 lb.
Salt	8 oz.
Fat	20 lb.

*Either high or low-fat flour can be used.

Directions

For the core, mix the soya flour and corn sirup in a kettle. Add the sugar, condensed milk and salt. Boil to 240 deg. F. Mix in the fondant, raisins and soya grits. Deposit in a suitable mold.

The fondant is made by mixing the soya flour and corn sirup in a kettle, then adding the sugar and water. The degree to which it should be boiled must be determined by experiment.

The coating is also made by mixing the soya flour and corn sirup in the kettle, then adding the balance of the ingredients. The temperature to which it is boiled will depend on the working conditions in each plant. It can be dipped on wax paper or on oil cloth, without sticking.

These formulas have been developed to suggest further uses of soya flours to increase the nutritional level, and must be checked under proposed plant operating conditions before undertaking manufacture.

Formula from A. E. Staley Mfg. Co.

FORMULA NO. 524

Orange Coconut Cake

Cake flour	5 lb.
Emulsifying shortening	2 lb. 6 oz.
Granulated sugar	6 lb. 8 oz.
Baking powder	4 oz.
Skim milk powder	8 oz.
Salt	2½ oz.
Macaroon coconut	1 lb.
Water	3 lb. 14 oz.
Whole eggs	2 lb. 10 oz.
Orange juice	6 oz.
Lemon juice	2 oz.
Grated peel of 2 oranges and 1 lemon.	

Directions

All mixing is to be done at low speed. Cream together the flour and shortening for 4 minutes. Add the sugar, baking powder, milk powder, salt, coconut and 2 lb. 4 oz. of water. Mix 2 minutes. Add the eggs. Mix again for 2 minutes. Add the fruit juice and gratings. Mix finally for 8 minutes.

Scale 12 oz. in 8-in. layer-cake pans. Bake at 360 deg. F.

Formula from Experimental Bakery, Armour & Co.

FORMULA NO. 525

Butterscotch Pudding With Soya Flour

Bakers' starch	100 lb.
Brown sugar	90 lb.
Full-fat soya flour	42 lb.
Salt (variable)	2 lb. 4 oz.
Vanillin	4 oz.
Coumarin	¼ oz.
Imitation butterscotch flavor	8 oz.
Caramel color (variable)	4 oz.

Directions

Mix dry ingredients together thoroughly and package.

To use, mix 1 lb. 8 oz. of the powder with 12 oz. of brown sugar, add to 4 lb. of milk and 4 lb. of water and bring to a boil. If desired, 2 to 4 oz. of butter may be added after removing from the heat.

This is a "suggested" formula, and should be checked thoroughly under the proposed manufacturing conditions.

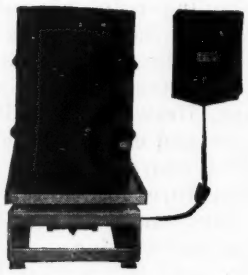
Formula from A. E. Staley Mfg. Co.

Get more out of YOUR Containers—by putting more into them with

SYNTRON

"Pulsating Magnet"

VIBRATORY PACKERS



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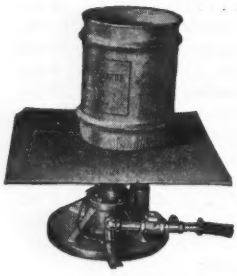
Capacities from small cans to large barrels.



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Especially effective on light, fluffy materials.

"EXPLOSION-PROOF"—for use in hazardous atmospheric locations.

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Food plants need all these features and they get them in Metso, double-action cleaner. It is Metso's quick-wetting and emulsifying powers that break up grease films. The removed grease is suspended and further prevented from re-depositing on the clean surface. Free-rinsing Metso leaves the surface chemically clean as well as bright.

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Sodium Metasilicate U. S. Pat. 1898707

Philadelphia Quartz Co., Dept. D, 125 S. Third St., Phila. 6.

Flavorist Views Food Processing

(*Continued from page* 71)

reconstituted by adding water, the beverage produced is pleasingly like the fresh product. Not many other fruits have been successfully "topped" for aroma in this way to produce complete concentrated flavor, but the success with apple juice is so conspicuous that a general reappraisal of other fruits for similar concentration is in order.

Protection of Flavor

Dehydrated vegetables have had very poor consumer acceptance because of loss of original flavor during dehydration, poor keeping of the dried product and inconvenience in reconstitution. Possibly something can be done to save the aroma now lost with some vegetables by methods analogous to that employed with apple juice concentrates. The dehydrated product, in any event, must be treated as a perishable food that should be kept cool. Thus favored, advantage may be taken of the saving in bulk and weight on dehydration.

One of the degenerative changes that takes place in all processed dry foods is the so-called "sugar-protein" reaction whereby reducing sugars, such as dextrose, react slowly with the amino acids of any proteins present to give brownish color and caramel-like odor and taste. For example, attempts to keep honey mixed with peanut butter or other rich source of protein end up with dark-colored products of nondescript "burnt" flavor. It has also been observed that vitamin C disappears rapidly as food "caramelizes." The prevention of this unfavorable reaction calls for avoidance of reducing sugar (sucrose, it will be remembered, is not a reducing sugar) and proteins in close proximity in the same composition, and for keeping cool any unavoidable combination of these ingredients.

A considerable advance has taken place recently in the preservation of dried peaches and other stone fruits with sulphur dioxide. The fruit is blanched and "sulphured" and then is dried in a dehydrater, rather than in the sun, to produce a high-quality article. When peaches so processed are reconstituted by soaking in water and then boiling off the residual sulphur dioxide, the product has been stated by experts to have better flavor than many canned peaches. The

All Patents Waived On Machine For Speeding & Packaging Victory

Details Gladly Supplied By The War Finance Division

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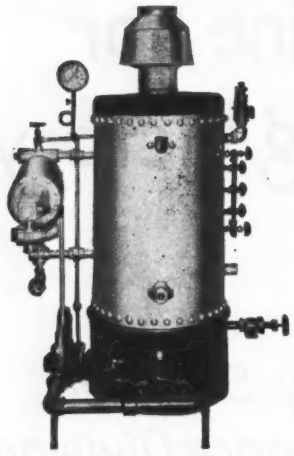

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The reliable MKayO automatic, gas-fired, steam boiler, built in sizes from ¾ to 5 H. P., may be just the small boiler best suited to the needs of your plant. It supplies steam with safety, it is compact, an economical user of fuel and is reasonably priced.

We are here to supply your *urgent* needs of today . . . or to help you *plan* for tomorrow. Our engineering consultation, backed by long experience in serving the food industries, is always available. Call on us for that boiler you*must* have now . . . or let us figure on a new boiler for post-war needs.

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Manufacturers of Automatic Steam Boilers for over a third of a century.
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Regarding Control of

Skin Irritations

TARBONIS is effective in both preventing and clearing up skin irritations resulting from the handling of a wide variety of foodstuffs—too long immersion of hands in brine—constant contact with acid-type foods, etc.

TARBONIS is easy to apply, unnecessary to remove, will not stain or soil, and is *harmless to the foods handled.*

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THE TARBONIS COMPANY

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product treated by this recent development of Dr. Emil Mrak and his associates of the University of California is not yet available for general use.

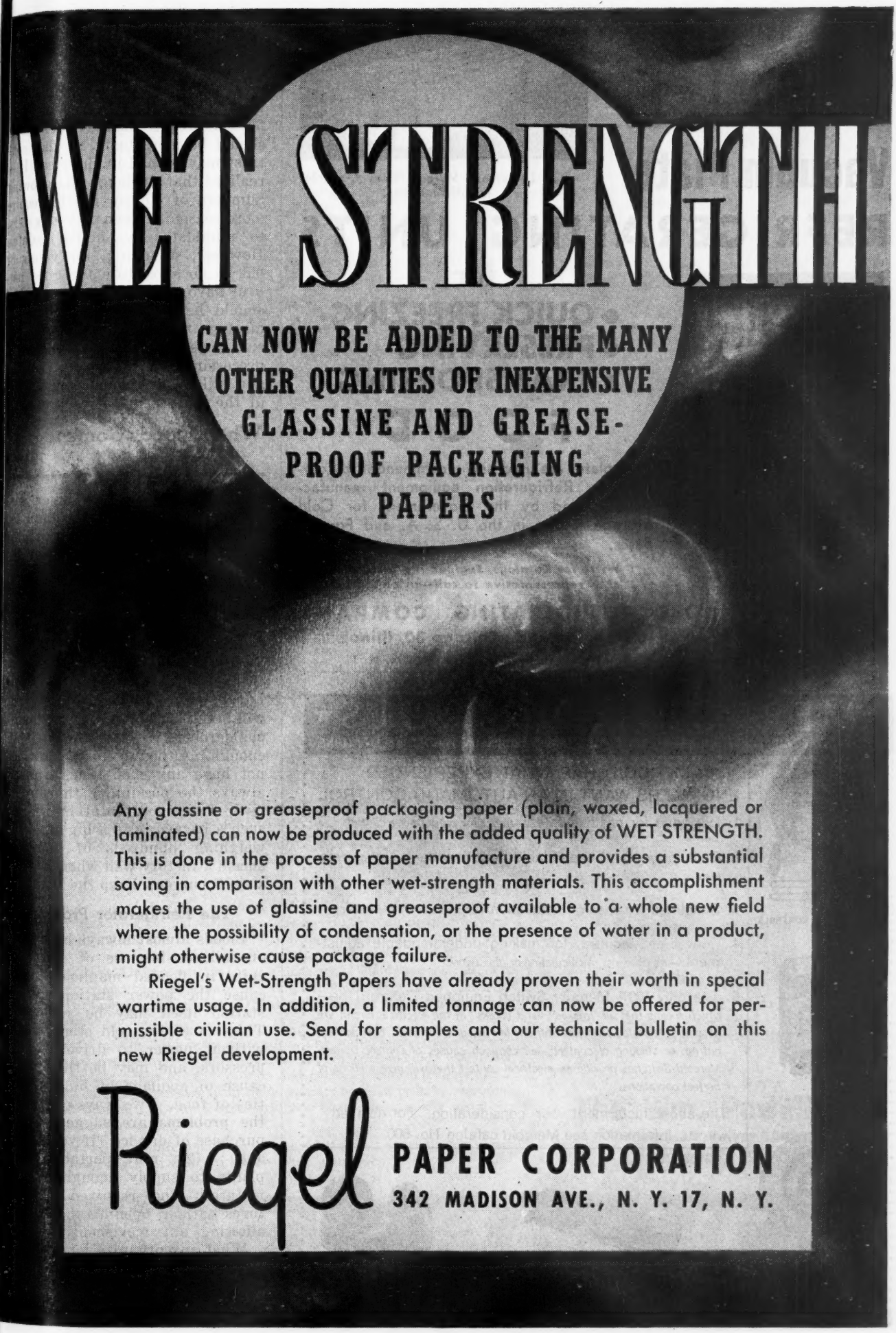
Almost complete removal of sulphur dioxide is necessary for good eating quality in any food. Whenever this preservative is used in products which are not to be boiled before use, as occasionally in orange juice and raspberry jam and rather commonly in wine, it produces a distinct throat irritation.

Serving for Best Flavor

The National Coffee Association has taken two vigorous steps to improve the quality of beverage coffee in restaurants and in the home. The first step is to give a seal of approval only to home brewing equipment meeting certain requirements. It must extract the desirable proportion of soluble material from the coffee, about 20 percent of the weight of the bean, and must extract at a temperature above 200 deg. F. The temperature of the finished brew must not reach the boiling point or fall below 165 deg. F. The second step is the specification that directions furnished with brewing devices must be based upon the Association's standard measure, which holds 1/40 lb. of coffee, or on its equivalent, two level measuring tablespoons. Special measuring devices are being developed for home use that will hold the required 1/40 lb. Restaurants will be expected to use just 2 gal. of water to the pound of coffee in the urns, to deliver 40 cups.

The gourmet knows that order-cooking is best, with the minimum time spent between the oven or saucepan and the table. He knows that needless evaporation of even a little water from the hot food will carry off with it much of the precious aroma that has persisted through the various stages of preserving, storage and preparation. He sighs when he must eat at large banquets, when foods are likely to be dearomatized. However, he puts on some butter and other seasonings and hopes to build up a palatable flavor. How must he feel at a cafeteria, with steam heat under the uncovered serving dishes assuring that evaporation will proceed until the volatile flavors are gone? Cannot some mechanical genius devise a way to dispense hot food without such evaporative loss?

The seasoning of food is impor-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Riegel's Wet-Strength Papers have already proven their worth in special wartime usage. In addition, a limited tonnage can now be offered for permissible civilian use. Send for samples and our technical bulletin on this new Riegel development.
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- QUICK FREEZING
- PRESERVING
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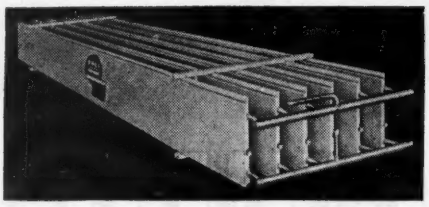
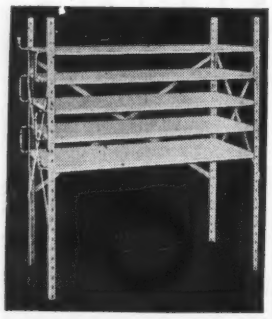
FOOD



Dole Locker and Storage Plates Available in different sizes.



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tant, and more and better seasonings may be in order. Most people like a considerable part of their meal to be bland or low in flavor. Bread, potatoes and some meats fill this requirement. Other items should be more tasty, so that contrast may be had in the meal. It is realized that the large and growing numbers of elderly people require more seasoning than do youngsters, to stimulate less active palates. However, seasoning, for young or old, is no substitute for good natural flavor. A good processed food should be delicious originally and must go through all of the successive operations of preparation, processing, keeping and serving and still have good aroma and all of the other sense attractions.

When Floods Come

(*Continued from page* 73)

sacks. Then the next layer sank into the water where its sugar, too, dissolved. In time every pound of more than five tons of sugar dissolved in one inch of water.

A common mistake is to empty the contents of tanks to save the material. If a tank is full, and closed, it is safer than if empty. This failure has been observed particularly of gasoline storage tanks. Large empty bulk-storage tanks will break loose and become dangerous derelicts if the water goes high enough. Although your plant may not have any such tanks, there is always the possibility that up the river from your location there is such a hazard. And a big steel tank weighing hundreds of tons can smash a factory wall when borne on a swift current. Keep the tanks full.

The Refrigerator Problem

Floods almost always cause power failures because of short circuits in flooded manholes or because the power station or substation itself may be submerged. This leaves the cold storage plant without power to drive its compressors, and may be the indirect cause of spoilage of huge quantities of food. Two ways of meeting the problems are suggested: (1) purchase of dry ice (if you can get any); (2) rent portable power plants to supply enough juice to maintain the required temperatures without opening the doors or allowing any movement of goods.

What any organization should do to minimize the losses from high water cannot be stated categorically. All that one has to do is to learn what others have tried and

Maintenance made easy with POWELL VALVES

Fig. 150
BRONZE "UNION" COMPOSITION DISC GLOBE VALVE

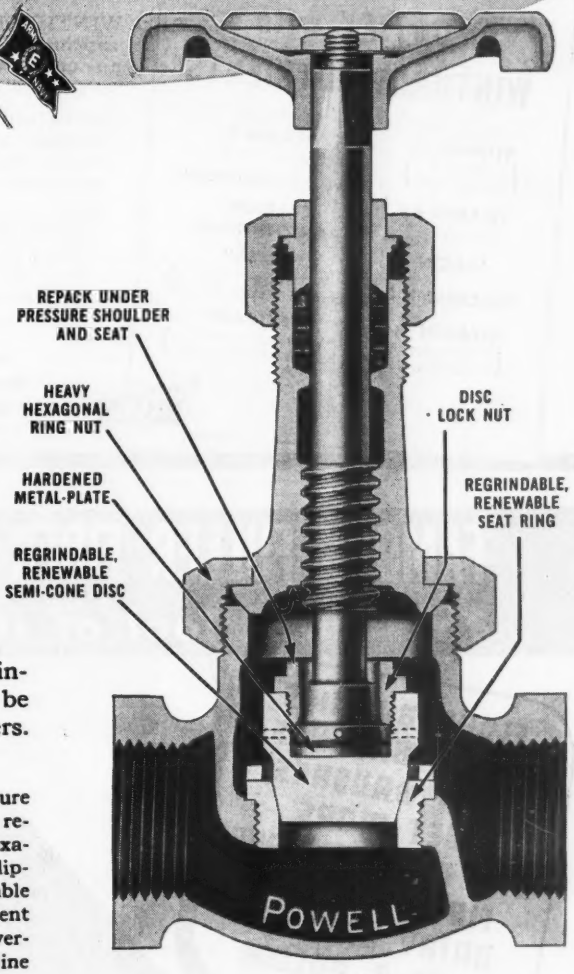

Fig. 1708
BRONZE "WHITE STAR" GLOBE VALVE

In these days of round-the-clock operation, time spent in the maintenance of equipment means a loss in production that can never be made up. If it's flow control equipment, Powell has the answers. Here are two examples.

Fig. 150—a Union Disc Globe Valve—is an economical valve for low pressure steam, oil, water, gas or air. The composition disc can be quickly and easily replaced without removing the valve from the line merely by backing off the hexagonal ring nut, lifting the bonnet assembly out of the body and removing the slip-on disc holder. The discs, especially for the smaller sizes, are readily obtainable and very inexpensive. Discs of various compositions are available to meet different service conditions and the importance of using the *right* disc cannot be overemphasized. The seat can be refaced without removing the valve from the line as indicated above.

For *extra long life,* Fig. 1708 is recommended. The seat ring and disc are made from special hard metal compositions. The hardness of the seat and disc, with their wide contact surface, tends to resist erosion and corrosion over a long period of time. Without removing the valve from the line, seats and discs can be reground to a new tight bearing and, when necessary, new ones can be easily installed. No special tools are required.

All Powell Valves that require repacking are provided with a specially machined shut-off to permit repacking under pressure when wide open.

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Dependable Valves Since 1846
Cincinnati 22, Ohio

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found wanting, or what others wish they had done before it was too late. Then use your imagination and your head. Losses of paper, labels or shipping containers are well-nigh irreplaceable.

Letters to Editor

(*Continued from page* 104)

these odds and ends were made and shipped to the warehouse over a period of several years as spot-stock for local-area delivery. No record of storage conditions had been kept. The contract merely specified refrigerated storage for summer months.

These odds and ends did show "bloom" and "sweating" damage.

If our tempering technic was faulty and responsible for the powdering at storage temperatures of 67 to 69 deg. F., we had company. Perhaps present-day temperature-indicating instruments and mechanical means for tempering chocolate have eliminated the troublesome factor that then gave rise to the "graining" or powdering of the chocolate coatings at the storage temperature range of 67 to 69 deg. F. If so, well and good. But if there is not that assurance of correct tempering or correct use of temperature indicating or controlling instruments, it is well to remember that storage of chocolate coatings at 67 to 69 deg. F. has caused more than one chocolate manufacturing and candy making company considerable trouble and extra expense in times past.—E. S. STATELER, *Associate Editor of* "FOOD INDUSTRIES."

Packers Use Real Smoke

To the Editor
Of Food Industries:

We have just been reading with a great deal of interest the article in your January issue entitled, "Philosophy of a Cook," by Crosby Gaige. We found this to be good reading until we came to the material on page 182 where, referring to the pumping of hams, the statement was made: "If meat packers will use this gift of science to reasonably accelerate the curing process—giving time for the development of the amino acid flavors generated by mysterious inner chemical reactions and then embroidered and laced with real smoke, not the synthetic smoke of phenols, wood-tars, formaldehyde and aliphatic acids—you and I can well rejoice that a great national institution has been . . ."

Clean

● Just the single advantage of being clean makes Cleaver-Brooks Steam Generators the first choice of many experienced steam plant buyers in the Food Processing industry.

The modern design and construction of Cleaver-Brooks oil-fired steam generators assure clean, smokeless, efficient operation, and a "show-place" boiler room.

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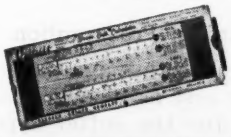
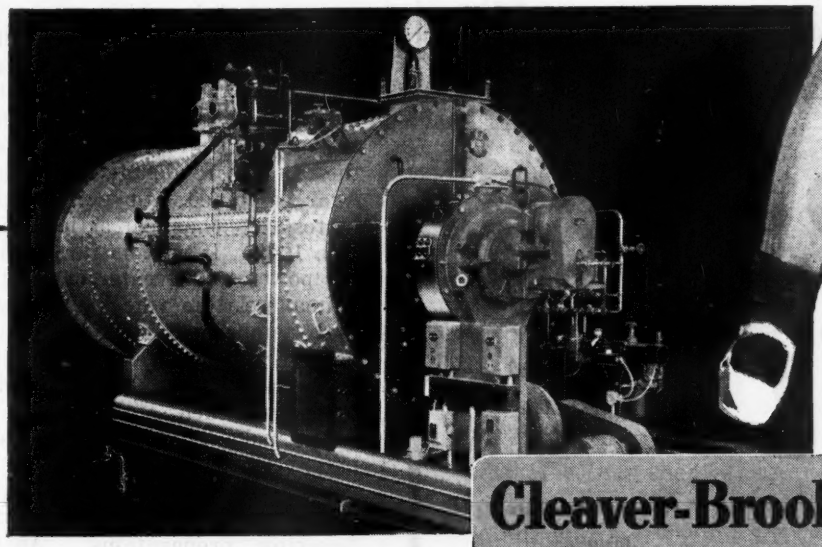
5103 N. 33rd Street • Milwaukee 9, Wisconsin



WRITE ON YOUR BUSINESS LETTERHEAD
for the Free Steam Cost Calculator—a ready-reference slide rule showing the comparative steam costs when using oil or coal as fuel.



Why Not Have a Steam Plant with All These Advantages?

Cleaver-Brooks
STEAM GENERATORS

● A steam-plant tailored for your job. Cleaver-Brooks analyzes your load conditions, space and equipment arrangements, future growth needs, puts unit into initial operation, instructs as to operation, care, maintenance.

● Designed for utmost convenience of operator — all controls may be operated from front of boiler. A factory engineer puts unit into initial operation, and trains your employees in operation, care and maintenance.

● One source and one responsibility for the complete generator — Cleaver-Brooks Factory-finished and tested — a fully "packaged" unit meeting all code requirements.

● Fast installation. No special foundation needed. Within 24 hours after arrival, your Cleaver-Brooks Steam Generator can be in operation.

● No smoke-stack required; simple roof-high vent exhausts combustion gases.

● Saves space, uses less plant area, fits into low head-room locations.

● Oil-firing eliminates smoke, ashes, clinkers, messy boiler-room conditions.

● Low operating costs; unsurpassed guarantee: — 80% thermal efficiency; 13% CO_2 gases; stack temperature not to exceed 125° F above saturated steam temperatures.

● Quick steaming — for any emergency or fluctuating loads — through high heat transfer with Cleaver-Brooks 4-pass down-draft construction and integral oil-burner.

● Full size range is available — 22 models in sizes from 15 to 500 hp., at steam pressures from 15 to 200 lbs. p. s. i. Write for bulletin and complete information.

Materials
PROCESSING
EQUIPMENT
Sifters, Crushers, Cutters, Dry and Liquid Mixers, Mills, Grinders, Pulverizers, Conveyor Systems, Complete Installations.
The handling equipment construction "know-how" of the Mercer Engineering Works, Inc., Clifton, N. J. . . . The more than 40 years processing equipment experience of Robinson Mfg. Co., Muncy, Pa. . . . All are embodied in and represented by
MERCER-ROBINSON, CO., INC.
30 CHURCH ST., NEW YORK 7, N. Y.
Materials
HANDLING
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Trailer Trucks (All Types) Wheel Tractor Cranes (3 to 7 ton) Fork Lift Trucks, Lift Platforms, Hoists, Live Skids, Wheels, Casters.

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Call Ryerson for any kind, shape or size of steel you need. Steel for manufacturing, maintenance or construction ...all products are available for immediate shipment from any one of the ten convenient Ryerson Steel-Service Plants. Ask for a stock list...your guide to steel.

Principal Products Include:

Bars • Shapes • Structurals
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JOSEPH T. RYERSON & SON, INC.
STEEL-SERVICE PLANTS AT: CHICAGO, MILWAUKEE, ST. LOUIS, DETROIT, CLEVELAND, CINCINNATI, BUFFALO, BOSTON, PHILADELPHIA, JERSEY CITY

As for phenols, wood-tars, formaldehyde, and aliphatic acids; these products most emphatically are not used in the smoking preparation of meat. As the matter of fact, their use is even prohibited by the United States government under the authority vested in it under the Federal meat inspection act. This statement carries with it to the food trade, and others, completely erroneous information. The meat packing industry in smoking hams does use real smoke—and not chemicals.—NORMAN DRAPER, *Director, Department of Public Relations, American Meat Institute, Chicago, Ill.*

Agar Industry

(*Continued from page* 81)

ginate and pectin as stabilizer and bulk producers was granted to Washburn (1932).

Canning, Preservation

Meat canners use agar both as a thickening and as a gelling agent, especially for the softer types of meat and fish which might fall apart during subsequent handling after canning. The constituents of certain fish, such as herring, attack metal cans, and produce a detinning action, blackening the contents of the can and rendering it unsalable. Agar, combined with such fish, eliminates this chemical action (Gamage, 1922). It retains its gelatinizing power to a greater extent than animal gelatine when subjected to high temperatures and pressures necessary in processing meats or fish, and is also widely used in canning chicken.

Matsuoka (1924) was granted a patent for making dehydrated and powdered fish extract with agar for use in soups, gravies or other food flavoring preparations. Another patent was granted to Nishio (1924) for a similar process, except that the solidified mass of fish extract and agar was allowed to mold until a hard product was obtained. While such products might be to the Oriental taste, they did not appeal to the American palate and are no longer made.

Culture Medium

The most important service that agar renders to mankind is as a bacteriological culture medium, although the amount used for this purpose is relatively small. In the United States normally about one-sixth of the total utilization of agar is used for this purpose.

WHERE SECONDS COUNT in post-war merchandising

IN THE POST-WAR food store many sales will depend on what happens in a matter of seconds. A product will have to catch and hold the passing shopper's attention . . . make its appeal . . . sell itself . . . all in a few fleeting moments.

In this kind of selling, the package is all-important. It must quickly show the shopper exactly what the product offers and convince her it is something she should buy.

Surveys disclose eye-appeal is the basis of 85% of all buying. The shopper likes to see what she is getting. That is why the product packaged in transparent Du Pont Cellophane usually sells faster...it sells on *sight*.

Cellophane not only *displays* quality, but also *protects* it. This moisture-proof packaging material safeguards flavor and freshness—at *low cost*.

At present, military demands must come first, but we hope the day will soon arrive when there will be sufficient Du Pont Cellophane to permit our converters and ourselves to meet all your requirements. E. I. du Pont de Nemours & Co. (Inc.), Cellophane Division, Wilmington 98, Delaware.

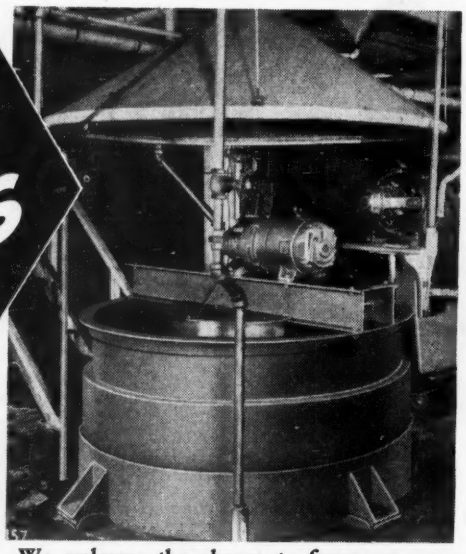
DuPont Cellophane

Shows what it Protects—at Low Cost

DU PONT

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

Special MIXING KETTLES



Send us your blueprints and specifications for special mixers, kettles, tanks, and pressure vessels. Stacey Brothers have the facilities and experience to produce such equipment to your complete satisfaction.

Shown at right is a Stacey Brothers Special Mixing Kettle installed at a meat packing concern. This kettle is our latest all-welded design. In addition to producing special kettles of this type, we also supply all gear and mixing apparatus.

We welcome the chance to figure on your needs.

The STACEY BROS. GAS CONSTRUCTION CO.

One of the Dresser Industries

5535 Vine St. Cincinnati 16, Ohio

Special STORAGE *and* PROCESSING EQUIPMENT

Stacey Brothers ENGINEERS • FABRICATORS ERECTORS • RECOGNIZED EXPERIENCE & FACILITIES

SIMPLICITY

in Testing

DEHYDRATED FOODS *for Moisture*

Special 40 gr. STEINLITE One Minute Moisture Tester

The STEINLITE electronic moisture tester is EASY to USE . . . like tuning a radio. All you do is weigh out a sample—pour it into the hopper, press a button, compare the meter reading with conversion chart, and you have the answer.

The Steinlite operates on the radio frequency impedance principle, and is checked against official oven methods. The Steinlite is a production control instrument and not a laboratory instrument alone. Ask our engineers to help solve your moisture testing problems.

SEEDBURO EQUIPMENT COMPANY

Seedburo Quality — Formerly Seed Trade Reporting Bureau — Founded 1912

634 BROOKS BUILDING CHICAGO 6, ILLINOIS

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Army Requirements for Dehydrated Foods

(*Continued from page* 79)

no longer a serious problem since most dehydrators have mastered the art of blanching and test both the blanched and the dehydrated products frequently. The peroxidase test developed by the Western Regional Research Laboratories has given very satisfactory results with white potatoes.

Wood slivers still cause trouble, particularly to cabbage dehydrators. Some plants now use all metal trays. Wooden trays should be made of wood with less tendency to splinter, kept oiled and waxed. Immediate repair of damaged and worn trays is essential.

As far as dehydration is concerned there are no helpful bacteria. Some cause injury prior to or during dehydration or during reconstitution when the soaking period is prolonged at elevated temperatures. These, or their enzymes and end products, may cause partial destruction of the nutritive value and alter the flavor and acceptability of the dehydrated foods.

The dissolved solids on the equipment and floor of the preprocessing portions of the plant are particularly favorable for the growth of certain species.

"Am I glad I've had a Job-Rated Truck during this war!"

Writes JOE E. PATTON
ALBERT LEA, MINNESOTA

BUY WAR BONDS

"This Dodge has been driven about 425,000 miles, and is still going practically night and day hauling buttermilk to the local milk-drying plant, where it's processed for shipment overseas," writes Joe E. Patton of Albert Lea, Minnesota.

"This work demands being *on* time *all* the time, and this truck has given me top record. Am I glad I've had a *Job-Rated* truck during this war!

"I've other trucks, but this Dodge has done the best job at the lowest cost, and I hope and believe it will carry on for another 300,000 miles!"

* * *

If YOU want this kind of long and economical service—let your Dodge dealer take care of your trucks! Depend on the "know-how" of his expert mechanics, on readily available factory-engineered parts. Make your Dodge dealer's shop your *"truck headquarters!"*

NEW TRUCKS AVAILABLE

Dodge is building new 1½ and 2-ton trucks, in limited quantities, for essential use. See your Dodge dealer for the right Job-Rated truck to fit your job—save you money!

DODGE DIVISION, CHRYSLER CORPORATION

TUNE IN MAJOR BOWES, CBS, THURSDAY, 9 P.M. E.W.T.

Keep going with
DODGE DEALERS' DEPENDABLE SERVICE

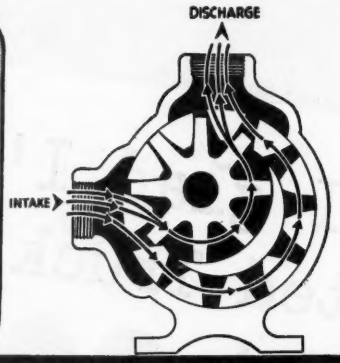
DODGE *Job-Rated* TRUCKS

TRUCKS ARE HELPING MIGHTILY TO WIN THE WAR!

Another Reason Why

VIKING

Is The
LARGEST SELLING ROTARY
PUMP IN THE WORLD



BY OPERATING THE VIKING PUMP IN THE OPPOSITE DIRECTION THE FLOW OF LIQUID WILL BE REVERSED

VIKING Rotary Pumps are designed and built to deliver liquids with a smooth, even flow . . . without pulsation or pounding.

"Smooth as silk" performance is assured because Vikings work with no reverse motion to create turbulence. With a Viking, the liquid enters your pump through an oversize orifice, travels in a curve three-quarters of the way around your pump, and is then discharged. Vikings will operate equally well in either direction.

For complete information about Viking Rotary Pumps widely used in the food processing industry, write today for Bulletin 100. It will be sent free by return mail.

VIKING PUMPS — FIRST IN AMERICA

VIKING Pump COMPANY
CEDAR FALLS, IOWA

Everything in Packaging Materials

PACKAGING HEADQUARTERS—Our organization is headquarters for every type of food packaging. We are packaging specialists.

OUR SELECTION of wrappings, bags and cardboard containers includes everything for food packaging . . . sheets, bags or envelopes; plain or printed cellophane; grease proof papers . . . we can package your peanut butter, dehydrated foods, meats . . . or what have you?

NEW IDEAS—We sponsor novel presentations. We are sales minded—and create eye-catching packagings that move goods. Consultation invited . . . no obligation.

PACKAGING DIVISION
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Bacteriological investigations carried out recently in some of the dehydration plants in the Pacific Northwest, by the Quartermasters Corps Subsistence Research and Development Laboratory with the cooperation of the University of California, indicate corrective measures which should be taken.

It is not sufficient to keep the plant free of visible debris by washing the equipment and floors with hot or cold water. These measures are essential and should be continued, but every plant must make liberal use of good detergents, hot water and "elbow grease." After the surfaces have been cleaned, an application of a chlorine-containing compound or other suitable germicide will reduce bacterial populations and the nuisances which accompany them.

Special attention should be focused on the belts of the trimming tables and on the conveyors which carry the products to the dicers and cutters. Slime should not be allowed to accumulate.

Holding tanks are distinctly undesirable from a sanitary point of view, because water containing soluble solids is an excellent medium for certain types of bacteria. Until holding tanks are eliminated from the preparation line, the water in them should be changed frequently.

The hands of the workers may occasionally contaminate the product, particularly after blanching. Hand rakes or hoes should be used instead of bare hands, or, clean rubber gloves should be worn.

Trays may also be a source of contamination, and every effort must be made to keep them clean.

The use of potable water is fundamental in every dehydration plant. If you do not use potable water, you are failing to produce according to specifications and taking the chance of polluting the product every time it comes in contact with water. Water not obtained from municipal sources should be tested for potability periodically.

Heavy tray loading, particularly of an uneven nature, holding loaded trays for protracted periods before beginning dehydration and too slow drying during the initial stages of dehydration can contribute to rapid development of bacteria on the product. These conditions are all subject to correction and must be attended to.

Colonel Dunn expressed the appreciation of the War Department for the work which the dehydrators are doing in keeping up production and improving quality.